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SCOTT'S
FIELD
SEEDS



SCOTT'S FIELD SEEDS



*Selected and Cleaned to be
Free from Weed Seeds, Dead
and Immature Grains.*

O.M. SCOTT & SONS CO.
MARYSVILLE, OHIO.

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FOREWORD



FACTS have more value than pictures. So all the space in this book is devoted to facts about seeds and seed buying, with the hope that it may prove an acceptable addition to the farm library.

We are convinced that our books are worth while and interesting because during the year we receive many letters like the following:

From a Professor of Agriculture in a Western State University: "I have been looking over your seed catalogue and consider it one of the best that I have ever seen; especially from the standpoint of giving good sound recommendations to your customers."

A New York customer said, "I have learned more from Scott's Field Seed Book than from all other catalogues and circulars combined."

The State Farm Bureau of a neighboring State wrote as follows: "I will be very grateful if you will mail me a copy of Scott's Field Seed Book. One copy has been received in this office, and it contains so much information the writer would like another for his own use."

This request for additional copies came from a Southern County Agent. "I am in receipt of a copy of 'Scott's Field Seeds.' There is a lot of good information contained in this book, and I am asking if you will send me about a dozen copies to distribute to some of my farmers."

If after reading the book, you think it contains information of value and interest, will you not kindly hand your copy to a friend and ask us for another, or as many as you like.

Weeds have always occupied a place of prominence in our book for they are the first thing that should be considered and avoided in sowing field seeds. Weeds are not only undesirable, but, to a large degree, unnecessary. They are the inevitable result of haphazard seed buying. In the section "How to Know Good Seed" we explain how these costly losses may be avoided.

The buyer of seed loses twice if he buys carelessly. He not only pays seed prices for weeds, but he plants weeds. The loss doubles again, for he has wasted the ground, and is put to the added expense of digging up the weeds. In the section of this Seed Book entitled "How to Know Good Seed," we give explicit instructions for the selection of seed. The test is a simple and sure one. We rely upon our seed to stand it.

Two years ago, the sowing of pure seed was urged on account of the extremely high prices; last year because of the low prices; this year on account of the average prices. It sounds unreasonable, but it is not. It is simply another way of saying that under all conditions, there is just one kind of seed that will make a profitable crop; that is seed which has been carefully selected and cleaned to be free from weeds and waste matter.

To save—is the thought uppermost in the mind of the man anxious to put his enterprise on a paying basis. It may be a factory, a store, or a farm. Bargains are sought. It takes nerve to pay the price for the best, but agricultural authorities are unanimous in the opinion that there are no bargains in field seeds. In a bulletin from the Virginia Station we find an emphatic warning against the tendency of Farmers' Unions and organizations to expect to obtain good seed at prices below the market quotations for the best seed. The article says in conclusion that "nothing but low grade seed is to be obtained at a cheap price." Seed buying is different. A second-hand plow, for example, may do every bit as good work as a new one; second grade grain may fatten

hogs more economically than perfect grain at the top price. Second grade seed, on the other hand, can never do the work of the best. Second grade seed is never a bargain, let the price be what it will. Just how costly the losses from poor seed are is definitely shown in the section entitled "WEEDS."

The mixed seed fad is about over. To the careless buyer, who did not ask the aid of free testing laboratories, or failed to test the seed himself, this stuff looked good; but hand-made mixtures offered at attractive prices are always dangerous.

After spending several weeks in Europe investigating grass and clover seed conditions, and after considering reports compiled from all producing sections in this country, we have come to the conclusion that prices on seeds will not be lower. Some varieties are too low. A few are higher than they have been for years, owing to a very small production. We have noticed that when a scarcity of any seed develops, the price immediately soars. Take Blue Grass, for instance: All of the seed was used up last year, and this season's production is not one-half normal. The price now has reached a point where the farmer can hardly afford to sow it. A little extra demand for other varieties will boost the price.

We are convinced that this season the early buyer will save money.

Never before has the field seed business demanded such constant attention. During the period of readjustment, many seedsmen selling direct to the user have failed. One cause is undoubtedly the tendency to divide attention with a garden and flower seed business. We are convinced that there are too many angles to Field Seeds to permit anything but specialization.

Nowadays markets must be studied very carefully, or big losses will be suffered. Thinking about field seeds only, we are able to furnish our customers with a little better seed than can be purchased elsewhere, and at more reasonable prices, quality considered. We thus render true service. Why the Field Seed Business needs the un-

divided attention of an organization is explained a little further on under "SCOTT'S SEEDS."

Weeds

SINCE the beginning of time Weeds have hindered legitimate plants, occupying their space and stealing their sustenance. Not only are they parasites, but the definite enemies of all useful plants. They take everything and give nothing. Wherever Weeds unmolested mingle with other plants, it is the Weeds that thrive and survive.

The annual loss to this country from Weeds is incalculable. The railroads of Ohio alone spend half a million dollars a year in the effort to suppress them. The State of Iowa estimates its yearly loss from Weeds to be five to six million dollars.

The presence of Weeds, aside from their indication of poor farming, means a loss in the following ways:

They rob crops of moisture and valuable soil elements.

They crowd plants out of space and light.

They may harbor plant diseases.

They may be poisonous to men and animals.

They may prevent the drying of hay or grain in the shock.

They constitute an adulterant in harvested products.

The twining kinds often interfere with harvesting.

They add expense to the harvest and loss to the grain.

They may interfere with the system of crop rotation.

The only service Weeds can be said to render is in saving the careless farmer from soil erosion, and adding humus. For this they require a terrible price.

Yet with all the destruction they inflict, and the

persistence of their growth, Weeds **can be suppressed**. A successful campaign may be waged against them with these four effective weapons:

Clean cultivation.

Short rotation.

Immediate eradication of new kinds as they appear.

Watchfulness against introductions in Seed.

The most practical, efficient and economical method of prevention of new Weeds is **Extreme Care in Seed Buying**.

Sowing impure seed is giving aid and comfort to the enemy. The Weed Seeds will be as evenly distributed as the Good Seeds, and will contend for every square foot of the ground.

Besides Weeds, impure seed contains a large amount of blasted grains. These make weak plants, easily crowded out by the Weeds. If seed from such planting were used again, the quality would further deteriorate, and eventually, as crop succeeded crop, the Weeds would gain complete control.

The largest and most profitable crops are always raised by the farmer who exercises the greatest care in the selection of his seed.

The following statement is from a Maryland Bulletin:

"The question of pure seed is a very important one in weed control. There is scarcely any agricultural question of more vital importance than the question of good seed; none in which slighter differences can have greater influence on the result; none in which there is greater opportunity for fraud.

"Nearly all our bad weeds have been introduced in seeds of various crops, especially in grass and clover seed. Weeds are being carried every year to new localities in this way. One must be constantly on the lookout, and no seed should be sown without a careful examination for weed seeds.

"Every farmer wants to be sure whether the seed he is planting is the variety or strain he wants, and whether it has sufficient vigor to make healthy plants; that is, whether it will germinate properly and whether it carries any infectious disease. He also wishes to know whether it is adulterated with weeds or other plants not desired."

On every hand it is plainly to be seen that the question of sowing pure seed is paramount. The farmer, who is not alive to the necessity of fighting weeds, is committing agricultural suicide.

The whole situation has been sized up by the U. S. Department of Agriculture in the following statement:

"In a sense, farming might be called a warfare against weeds. Some farmers emerge from the struggle victorious, while others go down to defeat. So powerful are weed enemies in reducing crop yields, while at the same time multiplying labor, that the farmer should at every turn strengthen his position against them. He should bear these invaders in mind in planning crops he will grow, and in deciding on the fields where he will grow these crops, in choosing the implements he will use, IN BUYING HIS SEED — far more important than to kill weeds is to avoid having weeds to kill."

The best seed is the first essential of economical production. No labor is wasted in weeding, and a maximum crop is realized.

Weedless seeds conserve energy. Weedy seeds waste it. Weedless seeds assure a profit, while weedy seeds make a loss certain.

Lest these first pages of our Seed Book convey the impression that seed buying is the all-important question, we call your attention to another subject of vital interest, namely: that of soil fertility. If every farmer would read "Friendly Workers of the Soil," we believe there would be a much better understanding of what actually takes place when legume crops are inoculated. Inoculation is not a problem for the scientist only, but a practical and a timely subject every one who operates a farm can profitably know more about. Read "Friendly Workers of the Soil" and you will feel well repaid.

Scott's Seeds

Carefully Selected — Thoroughly Cleaned

A DESIRE to furnish pure seeds must be accompanied with knowledge as to how that sort of seed can be obtained and properly handled.

It is a fact not well known that a very few small sections of this country produce Red Clover seed free from Buckhorn, one of the worst weeds we know. One section that has supplied us with considerable seed free from Buckhorn is now overrun with Dodder, a world-wide pest. A county long famous for pure Red Clover has succumbed to various clover diseases.

Some territory particularly favorable for Alsike seed is infested with Canada Thistle, probably the meanest weed that grows.

The widespread production of Alfalfa seed indicates that it should easily be found free from all weeds, but much western territory has Dodder, Russian Thistle and other weeds.

So it goes through the whole list of field seeds. Buckhorn, Dodder, Dock and other weed seeds cannot be entirely removed from Red, Mammoth, Alfalfa and Sweet Clover, even after the most painstaking cleaning. Canada Thistle, Dodder, Sorrel and Buckhorn will still be in Timothy and Alsike, if they grow with the crop. Bluegrass, Red Top and Orchard Grass are so light that few weeds can be taken out.

We have always maintained that seed must be **carefully selected as well as thoroughly cleaned** if freedom from weeds is a consideration.

We regard the map of the United States as a seed map, the complexion of which is constantly changing. It is not often that the same place will have a good crop two successive years. Half of a county may raise the highest grade of seed this year, and the crop of the other half may be worthless. Next year, and possibly for several years to come, that county may produce no seed at all.

Some sections that were full of fine clover seed last year have almost none at all this season. Other places that are producing a large crop of good-looking seed are also harvesting a great deal of Buckhorn and Dodder.

You want seed that will go far, that will add to production, and produce a crop that is practically free from Weeds. It would be unduly modest not to assert that we are supplying that kind of seed. Samples submitted to test will prove it to your satisfaction.

This cannot be said of all seed. In fact, a very small proportion of the seed grown in this country can be rated as being practically free from Weed Seeds and dead grains.

Pure seed is not any higher in price than the ordinary run. The several pounds of undesirable matter that is usually left in must be considered. Such impurities boost the price of the actual good seed to an unreasonable figure, even if the original price is low.

Careful buying of field seed means weighing price against quality, and seeking the best source of supply. Admittedly, pure seed is desirable seed. Where to get it and at a fair price are important things to know. Price is not all, for price without quality is waste and folly. Pure seed can be had, and pays returns all out of proportion to the care expended to secure it. Careless buying exacts a toll in depreciated crop that many times offsets any initial saving.

We deal in Field Seeds only, so that if there is any advantage in buying or selling we should have it, as our attention is devoted to growing and harvesting conditions, and the study of the markets, to crop yields and production prospects both in this country and Europe. All these things have a decided bearing on prices. We are enabled to buy at the most favorable time, and the advantage is passed on to our customers.

We want your conclusion to be that Scott's Seeds are handled intelligently, that they pass through a certain process before being distributed, that they are

economical to sow, and that you take no risk whatever in sending us your order.

It is the duty of every seedsman to keep informed on the new subjects of interest in the agricultural world. The latest arrival in the farm-family is "Hubam," or Annual Sweet Clover. Already it is an assured success. The leading facts about "Hubam" are given on page 32. You will enjoy reading them.

How to Know Good Seed

IF your field shows bare spots.
 If the weeds are about as plentiful as the sowed crop.
 If plants are small and weakly.
You have sowed the wrong seed.

Perhaps you bought mixed seed, or seed at a bargain price, or you may have paid the highest price without taking the trouble to have an analysis made.

Such an imitation of good seed cannot fool you if you use our test.

You fail to get the best results from your labor if you carefully work the ground and then make a mistake in buying seed.

A Bulletin issued by the Canada Experiment Station contains the following: "Too much care cannot be taken to procure clean seeds. An additional cost of 50 cents per acre for seed known to be clean is cheap insurance against losses caused by the introduction of noxious weeds. Commercial seed should be carefully examined, and the kinds and nature of any weed seeds included therein clearly understood before they are sown. Many seed samples that appear to be clean contain seeds of the most objectionable weeds."

In selling seeds we have found that the lack of ability to judge seed is accountable for many more failures to secure good quality than actual indifference.

The following test is very simple, but it is at the same time unfailing. We recommend it as the only way to estimate the worth of seed yourself.

TEST

Take a level teaspoonful of the seed you want to test and spread it out on a piece of white paper. Scrape to one side all the waste matter, such as dead grains, weed seeds and chaff. Compare the two piles.

One you can profitably pay for—the other means a loss, for which you pay the good seed rate.

This operation puts before the sower a simple basis of comparison between the worth of our seeds and the worth of other field seeds.

Consider that in buying a bushel of seed you get six thousand times the amount of waste matter found in a teaspoonful. Just three weed seeds in a teaspoonful means that one will be sowed on every square yard of ground when you sow at the usual rate.

To find the exact amount of pure seed, have a druggist weigh the pile of seed and then the pile of waste matter. Divide the small amount by the total weight, and the result will show the percentage of impurities in the sample.

You may be surprised to know how much worthless waste you have been buying along with your field seeds. And remember, weeds mean a loss, even if you get them for nothing.

HARD GRAINS

All clover seed contains a certain percentage of hard seeds that are slow in absorbing water. This percentage is largely dependent on weather conditions at maturing time. In making tests, clover seed is left in the germinator five or six days. Of course, some of the hard grains will germinate if not removed for several days longer, and many of them, undoubtedly most of them, will grow when planted in the ground and subjected to moisture, heat and the chemical action of the soil.

While it hardly seems possible, it is a fact that seeds having the finest appearance (and containing the largest amount of plant food to give the young plants a

good start) are those that ordinarily contain the greatest number of hard grains.

In buying seed it should be borne in mind that freedom from weed seeds is of greater importance than germination, providing, of course, that this is not unusually low.

GERMINATION

To make a germination test, remix the seed and count out, say, 200 seeds. Be sure to take them just as they come, and do not choose the best grains, for the object is to find out what percentage of the total seed will grow. The seed may be planted in a box of dirt or sand kept moist, or may be put between two blotters or strips of cotton flannel, placed on a plate covered with another plate upside down. This prevents evaporation. Keep the blotters moist, but not in water, and as near the temperature of 70 degrees as possible. Examine the seeds each day and see how they are germinating. Weak or slow germination indicates that the seed will make weak plants. Sprouted seeds may be removed each day if desired. Some seeds require a longer time to germinate than others.

The proper germination periods are as follows:

Clover seed between three and six days.

Timothy and Red Top between five and eight days.

Orchard Grass between six and fourteen days.

Kentucky Bluegrass, fourteen to twenty days.

If you want to go into the matter of seed testing a little more thoroughly, send for Farmers' Bulletin No. 428, from which much valuable information can be obtained.

The accepted system of making purity tests seems to be the only practical one, but a person not familiar with it is quite likely to be deceived. You would naturally suppose that 99 per cent pure meant that 99 per cent of the seed would be good, plump, healthy grains. But this is not the case, as is shown in the following

letter. We asked about clover seed; the same test is used on other seeds.

Department of Agriculture

Washington, D. C.

O. M. Scott & Sons Co.,

Marysville, O.

Gentlemen:—Replying to your inquiry of August 15, I would say that it is the practice of this laboratory to consider all clover seed as pure seeds in clover seed tests, whether they are shriveled or not, and all parts of seeds larger than one-half as pure seeds. Broken pieces smaller than one-half are considered as inert matter. This is also the practice recommended by the Association of Official Seed Analysts of North America.

Yours very truly,

E. BROWN,

Botanist in Charge.

In making a purity test seed analysts classify impurities as follows:

Inert matter, including broken seeds, dirt, stone, sticks, chaff, and other similar materials.

Foreign seed, including all seeds except those of the kind being examined.

We call particular attention to the fact that no mention is made of dead grains, not even those that are so badly shriveled that any one can tell there is no life in them. It is left to the germination test to show the actual value of the seeds.

Seed may contain 25 per cent or even more of these worthless grains and still test 99 per cent pure.

Above all things, test the seed yourself, or have it tested. Do not rely upon a claimed purity test alone, but use our test in judging the amount of dead grains the sample contains.

Remember, however, that dead grains are not of as much importance in the long run as weed seeds.

Dead grains constitute a dead loss. Weeds are a living one, inflicting enormous losses from sowing time until harvest. The very brightest and plumpest seed, testing 99½ per cent pure may contain enough weed seeds of a noxious variety to cause one to be sowed on each square foot of the field.

Not all seed can be sold on a "tell you how to test it" basis. Our seeds are sold in no other way, for we know that the more you know about field seeds, the more anxious you will be to sow Scott's Seeds.

"All seeds that I have purchased from you have been perfectly satisfactory."

JAMES W. MOREHEAD, Elizabeth, W. Va.

"Last year I got 100 pounds of Grimm alfalfa seed of you and sowed it on ten acres and got one of the best stands of alfalfa I ever saw. Now I want some information. Would it be advisable to leave it for seed? Does the first crop make seed or the second? Any information you give me will be appreciated."

J. E. ALDER, Fairgrove, Mich.

"I believe that if any county in Ohio has sowed more soys this year than Gallia that they are going some. Your seeds are very well liked down here and you sure have sold a bunch of soys."

R. H. MARTIN, County Agent,
Gallipolis, Ohio.

"The Soy Beans and Rape and Sudan Grass arrived O.K. and is planted. The finest seed I ever saw and I have bought of you for years—the germination is perfect."

M. CASSEL, Mantua, Ohio.

"Last spring, sometime in April, I sent your company an order for \$16.00 of grass seeds. You were strangers to me then, but not now. Will say it was the best seed I ever bought and the first good seed I have had in five years and it was a bad year out here on new seeding, not much rain here this summer. Will tell my neighbors all about your seed and help the good work along. Will give your company a good boost for next spring's trade."

M. S. PHILIPS, Kennedy, N. Y.

Alfalfa

THIS year alfalfa is plentiful and the price is reasonable. It is a good time to put a few pounds in the regular grass and clover mixture. It is always a good plan to sow a whole field to alfalfa, no matter what the price. But the possibility of getting imported seed should be considered. A great deal of it is coming into the country all of the time. Most of it is undesirable both as to hardness and growth. The Department of Agriculture can identify imported alfalfa. The commercial value of foreign seed is two or three dollars less per bushel than American grown. Alfalfa seed offered at less than the average price is quite likely to be the imported article.

Weeds — Alfalfa's Worst Enemy

It is a fact accepted by all Experiment Stations that weeds are the thing to consider when sowing alfalfa. The seed bed should be clean, and the seed itself free from weed seeds. If weeds are abundant, the young alfalfa plants will be smothered out. To get a good stand of alfalfa, two things are obviously necessary: land free from weed seeds, and alfalfa seed free from weed seeds. The first year weeds are alfalfa's worst enemy. Aggressive weeds can ruin a good stand.

In sowing alfalfa, it is a question not so much of pounds per acre as of quality of seed and proper soil conditions. Seven pounds of seed that is pure and of strong vitality is better than fifteen pounds that contain weed seed.

The expense of preparing land is the same no matter what kind of seed is sown. The actual difference in the cost per acre between the best and the poorest seed is very little, but the cost of care and of harvesting is greatly increased if weedy seed is sown. It is most unwise to sow weeds with one hand and fight them with the other. Trouble, annoyance and loss are saved by testing seeds. You cannot afford to omit investigating the seed you expect to sow.

That the danger of impurities is a real one is proved by analyses of more than 500 samples of alfalfa seed made by the New York Experiment Station. Of 548 samples, almost one-fourth contained seeds of dodder, while still larger percentages of the samples showed seeds of buckhorn, yellow foxtail and green foxtail. Considerable percentages contained wild carrot and Russian thistle, and occasional samples were contaminated with seed of curled dock, crab grass, Canada thistle, chicory, charlock, black mustard and quack grass.

Source of Purest Seed.

From the standpoint of purity and economy everything is in favor of Kansas seed, as alfalfa reaches the highest point of development in that State. Alfalfa from Kansas seed will recover more quickly after being cut, and will have a larger yield than

seed produced further North. We suggest that you consult your Experiment Station before paying an extra price for a well-advertised seed that may be full of weeds.

For the reason that Kansas furnishes ideal conditions for the growth of alfalfa and the development of the seed, it is always possible to get seed in that State that is absolutely free from weeds. In no other State is seed produced that is as pure.

In the first part of this book we have demonstrated many of the losses due to weeds and have shown that inferior seeds thoughtlessly sown may mean the spreading of weeds all over your own and neighboring farms. One of the leading authorities has the following to say on this subject: "Had a few Dakota farmers been alive to the danger when the first Russian thistles appeared in their flax fields, the spread of that most pernicious plant might have been prevented, to the great advantage of large areas of the country."

In sections where winter-killing occurs, and selection for hardiness seems necessary, we advise that by all means Grimm Alfalfa should be used rather than seed at a fancy price of doubtful origin and uncertain worth.

Feed Value

Protein is the element which to a large extent determines the amount of beef or milk a given feed will produce. The market value of any feed is based on the amount of protein it contains.

Nearly all stock feeds fall short of the proportion necessary to proper balance, but alfalfa furnishes this needed element in abundance.

You should not buy protein if you can produce it on your own farm.

Too often on farms where alfalfa is not raised, an unbalanced ration is fed owing to the high cost of concentrated feeds. A large part of the otherwise necessary cash outlay for high protein feeds can be avoided by the use of alfalfa, the most economical ration balancer at the command of dairyman or stockman.

Alfalfa and corn make not only the cheapest but the best balanced ration. To feed corn and other grains alone wastes starch, and animals do not thrive as well as when along with the corn a rich, palatable feed, such as alfalfa, is fed.

Vermont Bulletin No. 61 says: "It is richer in digestible protein, and a better soil and manure pile enricher than is any other plant of economic importance."

Circular No. 25, Michigan Experiment Station, says: "A ton of alfalfa hay contains 46.5 pounds of nitrogen, 12.2 pounds of phosphoric acid and 35.8 pounds of potash, and that its total present value, if purchased as commercial fertilizer, would be about \$10.80."

Alfalfa hay can be raised for much less than \$10.80 per ton, in fact it can be sometimes purchased for this price. When this

is the case one is actually getting the hay for almost nothing, because in returning the manure to the fields, only 25.3% of nitrogen, 22.5% of the phosphorus and 12.2% of the potassium is lost.

The sowing of Scott's Seeds will keep the manure pile free from weeds.

Preparation of Seed Bed

It is not possible to plow timothy or blue grass sod for immediate planting of alfalfa, without having the growth of alfalfa greatly interfered with by the grass. A cultivated crop, such as corn should be raised the year before; then it is unnecessary to plow the ground unless it is foul or of a very heavy character.

If plowing is thought best it should be done in the fall, especially if early spring seeding is contemplated, for in seeding alfalfa the loose, open seed bed, such as is prepared in plowing a short time before seeding, should be avoided. It takes nearly six weeks for plowed ground to settle for alfalfa seeding. Otherwise, capillarity, or the power of the soil to draw water to the surface is interfered with.

The surface should be cultivated until the soil is as fine as a well-prepared garden. This top covering prevents evaporation, and thus keeps the soil warm, besides leaving the seed in complete contact with the soil, which makes plant food easily available when the seed sprouts.

The young plants are likely to die in poorly prepared spots, these spots eventually becoming weed distributing stations. Hollows become filled with water and ice, which may kill the alfalfa.

Competition of Weeds. Poor Seed

The ground always contains weed seeds, and for this reason, thorough cultivation at intervals to kill them as they sprout is advisable. After going to this trouble, it is surely unwise to sow seed that contains weed seeds which will sprout at the same time as the alfalfa, and probably overcome it.

Lack of Fertility

While alfalfa is a deep feeder, drawing its food from greater depths than most plants, it is more tender than other clovers when young, and needs encouragement. Well rotted manure is the best fertilizer, but usually not available. Fresh manure, on account of weed seeds, should be applied to the preceding crop, or before plowing, the weeds being destroyed by frequent cultivation up to seeding time.

Fertilizers

If it is impossible to use either of the above, commercial fertilizers should be used, especially on poor soils. We like bone meal best. Any fertilizer used should contain a large amount of phosphorus. Alfalfa gathers its own nitrogen, if inoculated.

Acid Land. Need of Lime

The percentage of lime in the ash of alfalfa is almost 35, nearly twice the percentage shown by red clover, and more than 7 times that in timothy. Lime is beneficial to most plants, and to the legumes it is absolutely necessary. More lime is needed for alfalfa than for red clover.

If sorrel, dock, red top or blackberry bushes thrive in your fields and clover does not, undoubtedly lime is needed. If muriatic acid poured on the soil fails to make bubbles, lime should be used. If limestone pebbles or shells are present lime need not be added. The absence of these, usually, but not always, indicates the absence of lime. Valleys are not so apt to require lime as hills.

When in doubt about lime use it, or consult your station.

A large crop of alfalfa cannot be expected unless the bacteria which find their home in the nodules on the roots are present. These bacteria gather free nitrogen from the air, and pass it on to the alfalfa, but they have no use for an acid soil.

Of the three forms of lime, the one that is the most economical in your section should be used.

One hundred pounds of raw lime rock when burned is reduced to 56 lbs. of burnt lime or quick-lime. When this is water-slaked it takes up 18 lbs. of water, making 74 lbs. of hydrated lime. Therefore, 56 lbs. of burnt lime, or 74 lbs. of hydrated lime is equivalent to 100 lbs. of ground limestone.

Probably not less than two tons of ground limestone per acre should be applied, and more will not hurt. Apply as long before sowing as possible, even a year in advance.

Drainage

All plants require air in contact with the roots. If there is too much water in the soil, the air is reduced and root development retarded. A lesser top growth follows. Drainage takes off surplus water and admits air, causing circulation. Almost any wet soil, if properly drained, will raise alfalfa. The tile should be put in as deep as may be practicable.

Inoculation

A great many scientists have been giving years of study to the subject of inoculation. As far as we know, every one of them agrees that it is necessary to introduce the proper bacteria into the soil if the best stand of alfalfa is expected. The cost of time and material is small, so it scarcely pays to run the risk of partial or complete failure in order to save the trouble. Nitrogen is the most expensive fertilizing element. If the bacteria are supplied, alfalfa fills the soil with it at no cost.

Winter-Killing

Alfalfa seldom winter-kills on land well drained. Any clover is apt to winter-kill if there is little humus in the soil. Ground

containing plenty of humus is porous and ventilated; there are air spaces which favor the rapid carrying-off of excess moisture. Stiff clay soils that are devoid of humus become filled with water, which in freezing weather forms ice and causes the soil to expand and heave, pulling out and breaking off the roots. Fields that carry red clover through the winter will do the same for alfalfa. If each year it is becoming harder to keep a stand of clover, put humus in the soil. Soils that contain humus are warmer than soils that do not.

Seeding

Alfalfa may be seeded at any time from early spring until late summer.

Where winters are particularly severe, spring seeding is favored. In milder climates, due to the early growth of weeds, fall seeding is desirable.

Do not clip alfalfa in order to kill weeds until it is in blossom, or at least until the weeds are about ready to seed. This will kill the weeds in young fields. Early mowing may kill the young plants. The idea is to cut as many of the weeds and as little of the alfalfa as possible.

The alfalfa should not be allowed to form seed, for this requires plant food which should go to the roots.

Successful stands are often obtained by drilling the seed in the wheat fields in the early spring.

Sowing in the corn is a good gamble, if care is used to have the field free from weeds and in good order. A one-horse drill may be used, or the seed broadcasted, followed by a small harrow. If one cultivation is omitted, the alfalfa has a better chance on account of the earlier sowing.

Some sow in June, but we have found that foxtail and other weeds are still likely at that time to be a serious menace, and because we don't like weeds, we prefer to sow from July 20th to August 10th. This allows plenty of time for getting the ground in fine shape and for killing the weeds by cultivation. At this time the young plants receive full benefit of moisture, sunlight and plant food, as they sprout. Late seeding has many advantages on most soils. The land can be used for another crop before being prepared for alfalfa. During the first season the alfalfa plant needs to establish a deep root system to bring up food and moisture in future years. This growth of root depends upon the green leaves and roots above ground. The second year's production of hay will almost invariably be greater from late summer sowing in spite of the longer time for growing allowed by seeding in the previous spring.

Fertile ground does not require as much seed as poor ground. Poor seed will not go as far as good seed. Broadcasting requires more seed than drilling. Thus the amount required per acre varies, but as a general rule twelve pounds per acre will be found about the right amount. After sowing harrow lightly to cover seed and

smooth out any furrows left by the drill, as a heavy rain may bury the young plants. Alfalfa seed should never be covered to a greater depth than one inch. The top soil should be left loose.

Improving a Poor Stand

It is not always possible to thicken a stand where the plants are thin throughout the field, but if they are not over a year old the following plan may be used with success: Disk or otherwise cultivate the field, and harrow after sowing. The proper time to do this is early in the spring, before the old plants start. A thin stand from spring sowing may be improved by re-sowing in the fall if the rainfall is abundant. Ordinarily, alfalfa, more than one year old, makes a growth that will shade and smother out young plants. In improving a stand of this kind, some recommend frequent clippings until the new growth gets started.

Harvesting

Alfalfa leaves contain twice as much protein as the stems, about twenty-eight per cent in the bud stage. This should be kept in mind when the hay is being made, and every means used to save the leaves. Where the leaves shatter in feeding they should be saved. When scalded and mixed with other feed for hogs they make an economical source of protein.

The Kansas Experiment Station found that the protein content of alfalfa when one-tenth in bloom is 18.5%, when in full bloom, 14.4%. For this reason the mature hay is better for horses. But for other stock the green hay, with the larger protein content, is the more profitable. Providing new shoots have started, the best time to cut is just as the field begins to show blooms. There should be an abundance of shoots about $1\frac{1}{2}$ inches long. If too long, they will be clipped by the mower, and growing time will be lost, for alfalfa grows from the end of the shoot, like a fern. Diminished yield results if the crop is cut too soon.

The basal sprouts are the best guide to cutting, but in dry seasons the new shoots are sometimes slow in appearing. In this case the blooms must be taken as the sole guide, for the feeding value diminishes rapidly as leaves are shed to protect the plant from the drought.

In wet seasons the second growth may be six or eight inches high before the blossoms appear. It is better to observe both the sprouts and blossoms before mowing. Crowding alfalfa with too frequent cuttings will weaken the roots for the reason that they will not receive enough food from the stems and leaves; and weeds and grass are not smothered out as effectually, for they will have more air and sunshine. Nothing is gained in the end by cutting a fourth crop.

If the hay is allowed to dry too rapidly this loss of leaves happens during the curing process. A little experience, however, soon demonstrates that alfalfa is easily cured.

Alfalfa may be put in the stack or mow damper than is

generally supposed, that is while the stems are still quite tough or flexible.

Alfalfa should be let lie until the leaves are wilted, then raked into windrows and then into cocks, until cured. A heavy crop may be tedded. Alfalfa may be stacked when so dry that moisture cannot be wrung out by twisting the hay.

Usually the greatest growth is from the first crop, which is nearly always harvested during a rainy time, and requires more care in handling. Later crops, harvested in mid-summer, may be cut in the morning, raked into windrows in the afternoon, and put into the mow the next day.

Any kind of hay should be exposed to the hot sun as little as possible while curing. Too long exposure bleaches the leaves of alfalfa, and causes them to become brittle and fall off. Moreover, if the leaves have been burnt in the sun, they will not absorb the water in the stems, and the hay will cure slowly and unevenly. Curing through the action of air and wind is best, therefore, alfalfa should be cured in cocks, instead of in the swath.

The greatest quantity of hay is harvested during the third or fourth season. After this weeds, grass, etc., weaken the stand, and the yield decreases.

Pasturing

As a general rule it is best not to pasture alfalfa under any condition, although some authorities say that it is safe to pasture when the crop is ready for making hay by turning enough stock on the field to harvest it quickly.

Leaves Turning Yellow

The first growth of alfalfa sometimes shows yellow. This may be due to lack of either humus, of drainage, or of lime. Sometimes it is because the young plant is feeding in the surface soil and the condition disappears when the tap root has pushed farther down.

Millpoint, W. Va.

"I would like for you to see the field of soy beans from the seed I bought of you. They are so heavy it is going to be hard to find room to cure them. It looks like every bean grew and did its best. I have been growing soys for the last five years but this growth beats all."

C. M. WALLACE.

Peninsula, Ohio.

"This is my fourth order this year and will need some alfalfa seed later. Your seeds have proven very satisfactory. I have the best alfalfa field in our township and a clover field that is a feast for the eyes. As secretary of our township Farm Bureau I shall endeavor to have our members obtain the best seeds possible."

J. C. CONGER.

Grimm Alfalfa

Price lower than ever Before

We Guarantee Our GRIMM NOT to Winter-Kill

WE guarantee it for the purpose of dissipating whatever doubt there may be in the minds of prospective customers concerning seed purchased in a section distant from the place where first grown. This guarantee is designed to give sowers the necessary confidence not only in our GRIMM, but in the GRIMM strain as a safe and profitable crop.

To guarantee the seed to grow after it is in the ground would be impossible, as too many things can happen. But if the weather conditions permit the growth to come along all right, we will replace the seed, willingly and cheerfully, if the plants do not go through the winter. GRIMM ALFALFA should, of course, be planted in ground that will carry red clover through the winter; ground where the drainage and other conditions are not unfavorable. North of the Ohio River, alfalfa should be planted not later than August 10th because of the danger from dry weather, delaying germination so long that the plant will not get a good start before winter. We cannot guarantee GRIMM that has not reached a growth of 6 or 8 inches before it becomes dormant.

GRIMM will outstand ordinary alfalfa in wet ground, but it cannot be successfully grown on ground poorly drained. All investigators agree that it will do better on hard-pan soil than ordinary alfalfa, and it is the safest seed to sow in any part of the country.

As the department of Agriculture and the Minnesota Experiment Station indicate, it is the inherent characteristics of the strain rather than the locality which first reared it that make GRIMM ALFALFA HARDY.

The proof of genuineness is hardiness. There is no other positive proof. We GUARANTEE the hardiness of the GRIMM ALFALFA we furnish.

To guarantee GRIMM to be true to name, and to guarantee GRIMM not to winter-kill, are not at all analogous propositions. You could never prove that it was not GRIMM, but you certainly could prove it winter-killed if that were the case.

Different winter conditions cause alfalfa to kill. A rainy fall prevents the plants from becoming dormant early, making them much more likely to winter-kill than following a dry autumn.

Alternate freezing and thawing in clay or in humus-poor soil will break off the roots. Sheet ice often kills alfalfa.

GRIMM has the characters that enable it to withstand these conditions better than any other variety, and at the same time, it is thought to be more drought-resistant than ordinary alfalfa. For this reason many believe that on an average GRIMM will produce probably more hay than other strains.

Wendelin Grimm, a native of Germany, brought with him to Carver County, Minnesota, a small quantity of alfalfa seed. The seed produced exceptionally hardy plants, and when it was eventually recognized as a superior strain it became known as GRIMM ALFALFA.

As conditions in Minnesota are not favorable for seed production, only occasional limited crops were secured. But the demand grew, and as its value became known, sections more favorable to seed development were sought. Minnesota soil having pioneered the thing, that State acquired national fame as the producer of GRIMM ALFALFA, although, as a matter of fact, there has been but very little of it ever raised there at all.

Mr. W. A. Wheeler, now with the Department of Agriculture, writing of the hardiness of GRIMM, says:

"I saw a field of it in Saskatchewan, Canada, in 1906, which had withstood the winter when other stocks under trial were almost entirely killed out. In North Dakota, Minnesota, and South Dakota it has always shown its hardiness, never to my knowledge having been excelled in this respect where a good comparison was made. It is a fact that at the Minnesota Experiment Station, the Grimm Alfalfa has to some extent been killed out under most severe conditions. It is well known, however, that there are conditions in the vicinity of the Twin Cities and many other portions of eastern Minnesota which are unfavorable for alfalfa, and these factors are to a large extent responsible for some of the failures in this region. In fact, the Grimm Alfalfa, in its adopted home near Excelsior, Minn., rarely produces seed enough to pay for cutting the crop for this purpose. * * * At the Minnesota Station the Grimm Alfalfa seems to be very much the more promising, and this is highly recommended. The selection and breeding of alfalfa at this station has been handicapped by the fact that very little, if any, seed is ordinarily produced by the selected plants because of the unfavorable conditions of seed production."

Mr. R. A. Oakley, of the Department of Agriculture, in Bulletin No. 757, says:

"When Grimm Alfalfa first began to demand attention, all of the seed was produced in Minnesota, but as conditions there are not favorable for seed production, stock was sent to Montana and other western states in order that the available supply might be more rapidly increased. Carefully conducted tests of Grimm seed produced in Montana, Idaho, and the Dakotas indicate quite definitely that it has not decreased any in hardiness as a result of having been grown for one seed generation under these changed conditions."

These statements place all GRIMM distributors on the same basis. The producing sections are well known, the market is open, and all handlers are equally well located to furnish GRIMM seed that is true to name. Our extraordinary bid for your preference is in the extreme care we take to furnish seed that is clean and free from weeds.

Just why GRIMM ALFALFA is so much hardier than other alfalfa has never been satisfactorily settled, but the principal reason generally accepted is its low set crown which affords protection to the tenderest part of the plant. It is also aided by the branching tendency of the roots. It is, however, difficult to distinguish GRIMM from ordinary alfalfa by examining the root system. It does not show so large a percentage of branching roots as one would be led to believe from illustrations of selected plants and from some advertisements. Generally, about 40% to 70% of GRIMM roots are more or less branched, but a considerable per cent of the roots of common alfalfa also show this tendency. There is not much difference in the blossoms, except that GRIMM when in full bloom shows a higher percentage of mixed or variegated flowers. The seeds of both are exactly alike. This gives appropriateness to another extract from bulletin No. 757:

"The supply of seed on the market is still, however, rather limited, and commands a high price. As a result, unscrupulous dealers have offered for sale large quantities of common alfalfa under the name of Grimm. Because of this practice, prospective purchasers should take every means possible to learn whether seed is true to name before buying."

GRIMM ALFALFA has a definite market value like any other standard seed. GRIMM at a very low price could not be true to name, and so would be an unwise buy.

We have sold our GRIMM to buyers who had purchased GRIMM elsewhere, and found upon examination that it would be unwise to sow because of weeds. Seeds free from weeds is the cornerstone of our whole business.

In seed producing sections GRIMM Fields are grown for seed almost exclusively, owing to the extra price which the seed brings. The weeds in an alfalfa field tend to increase more rapidly when the stand is allowed to remain for seed each year than when the field is mown regularly for hay. For this reason one should be especially careful in purchasing GRIMM ALFALFA.

If you desire a field of genuine GRIMM, free of weeds, you will not be disappointed if your seed order is placed in our hands. You will have a lasting stand of heavy-yielding alfalfa.

Louisa, Ky.

"The seeds I purchased from you last spring have done exceedingly well. I was quite a heavy purchaser of your Bacteria and with good results."

JAY H. NORTHUP.

Newcastle, Pa.

"You have been selling me, for a number of years past, a considerable quantity of field seeds, which, I am glad to report, have always proven very satisfactory."

GEORGE GREER.

Biennial Sweet Clover

The Universal Plant

Sweet Clover is a universal plant, because it can be grown in nearly all parts of the world. It is raised in every State in the United States. In many clover-producing sections that have suffered from Red Clover diseases, it is replacing this legume. Sweet Clover seems almost entirely free from diseases. This year the price is very low.

There are a large number of varieties of Sweet Clover, but only three are of value in this country, namely, White Biennial (*Melilotus alba*), Yellow Biennial (*Melilotus officinalis*), and Annual White Sweet.

While the white, on account of its larger growth, is the most popular variety, the yellow biennial is preferred by many for both pasture and hay on account of its finer and more branching stems. It seems to be a larger producer of seed. It has the advantage of maturing about two weeks earlier than the white.

When Sweet Clover is mentioned without any special variety being named, it is always understood that the biennial white is meant.

Its extensive root system enables it to gather the little plant food remaining in worn-out and abandoned soils. The abundant root nodules store nitrogen and the decaying roots add humus. The deep penetration of the longer roots improves the drainage and after a crop of Sweet Clover the soil is always more friable and mellow, so that following it a good crop, even of corn, may be raised, though no profitable crop could be grown before.

Observe the uncultivated spots where Sweet Clover appears to grow the best. Organic matter, or humus, seemingly is not necessary, but these spots always contain lime and the ground is always hard. This indicates the method that should be employed in order to be sure of a good stand of this valuable plant. A firm seed bed should be prepared and lime must be applied if the soil is acid.

Inoculation is almost necessary.

Freezing weather does not injure the bacteria, nor exposure to the sun's rays of the seed sowed on top of the ground, as the under part of the seed contains sufficient bacteria. Scott's Bacteria is guaranteed for winter as well as summer use.

Sweet Clover prevents erosion on hillsides. It practically never freezes out during winter or spring. It is a weed-killing crop because of its rank growth. It builds up worn-out pastures and meadows. It will carry several times as much stock as ordinary pasture land. It contains more protein than Red Clover. Unlike alfalfa, it is not injured by pasturing. Plowing it up is easy, for although the roots are quite large, they are soft and decay rapidly.

Bee keepers for years have recognized the value of Sweet Clover. The honey from Sweet Clover is of good color and flavor.

As a universal plant it leads even alfalfa, for it will grow not only in any climate, but on soils where alfalfa fails. Where it is at first impossible to get a stand of alfalfa, Sweet Clover will furnish a profitable yield and at the same time prepare the ground so that there will be no difficulty in establishing alfalfa permanently.

For four or five weeks after germination, Sweet Clover makes but a slow growth above the ground, but the root system is developing, getting ready to meet unfavorable conditions, and as is the habit with biennials storing up food not only for this but also for the next season's growth.

The tap roots during the first season will sometimes reach a depth of thirty inches. The top growth is rapid after the plant has once become established.

For Green Manure

Nitrogen from any source except manure, and the growing of leguminous crops, is too expensive to return a profit. According to recent experiments conducted by the Illinois Experiment Station, Sweet Clover offers the most promising indications that the problem of supplying a cheap source of this element can be solved.

Sweet Clover possesses the following characteristics, which make it far superior to other crops as a green manure for nitrogen production:

1. It is adapted to almost any climate.
2. Hardiness to cold or drought.
3. Resistance to disease and weeds.
4. Large production per acre at the proper time for plowing under.
5. Rapid decomposition.
6. Deep rooting habit makes impervious subsoils porous.
7. Obtains plant food from insoluble minerals more readily than other crops.

A crop that grows rapidly in early spring, and decomposes rapidly, makes an ideal green manure. It also keeps in the soil large amounts of plant food by its rapid growth. Besides, Sweet Clover, when properly inoculated, gathers nitrogen from the air. It stores in its roots great quantities of nitrogen, which are available as soon as growth starts the second year. When turned under, the leaves decay rapidly; the roots and stems more slowly. The three different parts represent three sources of nitrogen to be drawn on over a considerable length of time.

Few soils are able to meet large crop demands for nitrogen. Since Sweet Clover will supply nitrogen at an insignificant cost, it could well be utilized by most farmers as a green manure crop.

One soil may contain twice as much nitrogen as another and still produce less crops, because the nitrogen is resistant to decay. A small amount of active nitrogen in a poor soil may produce more than a larger amount of inactive nitrogen in a rich soil. It is most

important to keep as much nitrogen as possible in the active state of decomposition when it is needed by crops. If this is done by inoculated legumes, then the amount of nitrogen that should normally, or always, be in the soil, is at the same time preserved.

Sweet Clover's ability to do this should not be overlooked. To conserve nitrogen may be as important as its addition.

These investigations by Messrs. Whiting and Richmond showed that one ton of water-free, or about six tons of green Sweet Clover (roots and all), furnish as much nitrogen as twenty tons of farm manure.

The tops on a water-free basis averaged 4.38 per cent nitrogen, which means 87.6 pounds of nitrogen per ton of dry weight. The roots weigh as much as the tops and the nitrogen content is about the same, which indicates more than 170 pounds of nitrogen.

Sweet Clover, when used as green manure, will add to, conserve, and make available the nitrogen of the soil.

It is the most reasonably priced clover and this is a sensible year to sow it in preparation for high grain prices which are sure to be with us in another year.

Pasture

It is claimed by some that an acre of Sweet Clover will furnish pasture for five or six times as many animals as will the ordinary mixed grasses. While some stock will refuse Sweet Clover at first, they all soon get the habit, especially if turned into the field when the plant is small and tender.

During the first year grazing can start when the plant is about six inches high and can be continued until late in the summer.

When seeded on wheat fields during the winter or early spring an abundance of fall pasture is available when most fields are affording very little feed.

The second year Sweet Clover makes a quick, early growth and may be pastured sooner than any other plant. If a seed or hay crop is wanted it can be pastured until the middle of June, for grazing really benefits the stand by causing the plants to stool and make a larger number of branches.

When a field is used for pasture alone enough animals should be grazed to keep it eaten reasonably close. Then there will be a constant supply of small, tender shoots. Should the plants become coarse the pasture can be clipped to stimulate the growth of fresh shoots; setting the mower knife eight inches high.

Do not be afraid of pasturing too closely. Usually the more stock you turn on Sweet Clover the better.

If stock are removed about two months before heavy frost the pasture will reseed itself.

Besides furnishing the earliest pasture, it thrives during the hot, dry summer months and makes some growth after the first frosts.

One acre will furnish pasture for at least 20 shoats.

There is less danger of bloat than from alfalfa pasture.

As stock crave a dry feed when pasturing on Sweet Clover, it is often desirable to have a stack of straw or hay in the meadow.

Cutting First Year's Growth

The first year the crop should be cut for hay at about the time growth ceases. There are two important reasons for cutting at this time. In the first place, this season's growth does not become woody and it is safe to wait until the maximum growth is made. Second and more important, there is no danger of injuring the plants by cutting too close, because the first growth of the second year starts from the crown. Shortly before the end of the growing season the crown buds are noticeable, after which it is safe to cut. This point is not generally well understood.

The fact that buds for new growth are all ready to start at the beginning of spring, along with its vigorous root system, makes it produce pasture so much earlier than other plants.

The first year, do not clip Sweet Clover during the summer unless absolutely necessary.

If the plant is clipped to kill ragweed or other weeds, the cutter bar should be set quite high, for after being clipped there is no further growth from the main shoot, but dependence must be had upon the lateral branches for pasturage or for hay. As many of these should be left below the point of cutting as possible.

Cutting Second Year's Growth

"While the first crop in the second year comes from the crown buds, the new branches which produce the second crop of the second year come from the buds formed in the axils of the leaves on the lower portions of the stalks which constitute the first crop. These branches usually commence growth when the plants are about 24 inches high. In fields where the stand is heavy and where the lower portions of the plant are densely shaded, these shoots are soon killed from lack of necessary light. The branches which are first to appear and which are first to be killed are those closest to the ground. It is therefore very important when cutting the crop to cut the plants high enough from the ground to leave on the stubble a sufficient number of buds and young branches to produce a second crop.

"In fact, the stand should be cut several inches above the young shoots or buds, as the stubble may die back from one to three inches if the plants are cut during damp or rainy weather."

We quote from U. S. D. A. Farmers' Bulletin No. 820. This explains very clearly why care should be used in cutting Sweet Clover. We advise reading of this bulletin as well as Mr. Coe's other Sweet Clover Bulletins, No. 797 and No. 836.

Hay cut the first year is fine-stemmed and palatable.

Hay must be made the second year before the bloom buds appear, as the plants become woody about this time.

The hay is cured in the same manner as Red Clover or Alfalfa, but being more succulent a longer time is required.

As in handling other clovers, the idea is to get rid of the water gradually instead of allowing the leaves and stems to be burnt by the sun. This saves the leaves, the most valuable part of the plant. The hay should lie in the swath until well withered and then be raked into windrows. The next day, if sufficiently dry, it must be put in cocks and cured. The cocks should be of such size that they can be loaded in one forkful in order that as few leaves as possible be lost.

Seeding

From a labor-saving standpoint, at least, probably the best time to sow Sweet Clover is during the winter any time from January to April on corn ground or other bare ground. Freezing and thawing will bury the seed and cause the hard grains to germinate, there being quite a large percentage of these in any Sweet Clover that has not been scarified.

Even when the laboratory test shows the germination of Sweet Clover to be quite high it will not respond to moisture as quickly as Red Clover, more rain being needed even when the seed has been scarified. For this reason growers are sometimes surprised to find that they have a poor stand of Sweet Clover, while in a neighboring field sowed with Red Clover at the same time, the growth has been entirely satisfactory. However, as a rule, under field conditions, Sweet Clover shows a larger percentage of germination than in the seed germinator.

A firm seed bed is important, as it is in contact with the moist subsoil, so where necessary to plow, if possible the ground should be plowed in the fall and harrowed down, the seed being broadcast during the winter months. However, seeding may be done in April or May on a well prepared, firm seed bed with just enough loose soil to cover the seed. Like any other clover, Sweet Clover may be seeded on wheat or rye in the spring, or with oats or barley.

August seeding is not desirable in most sections, for then the plant lasts but one growing season and does not reach its largest development. Many sow during June or July; some as late as the last of August. The Virginia Experiment Station recommends sowing in August for pasture and hay crops the following year.

While Sweet Clover, once it is established, is very drought-resistant, the plants when young must have an abundance of moisture on account of the deep-growing roots.

Too heavy seeding means that young, small branches and leaves on the lower part of the stem will be killed by the crowding. This necessitates higher cutting and makes less and coarser hay.

Inasmuch as Sweet Clover has a hard seed coat, scarifying has proved to be a profitable operation.

It requires ten or fifteen pounds of this seed to the acre; when the unhulled seed is used fifteen or twenty pounds. The scarified seed is best for summer or fall sowing, for the germination is more

rapid. For winter sowing possibly the unscarified, hulled seed is to be preferred. We furnish this or the scarified seed at the same price.

Seed Production

When a seed crop is to be saved, Sweet Clover should be first pastured or cut for hay. The stock should be removed from the pasture early enough to assure the maturing of seed; if hay is made, the cutting should be reasonably early, thus assuring a larger number of branches. Of course the mower should be set high, as new shoots will come not from the crown, but from the axils of the lower leaves.

The mower, however, is not as satisfactory for cutting Sweet Clover as the binder, for the reason that too much handling is necessary. The self-rake reaper is best, but a binder can be equipped at small expense for handling the clover economically and with small loss of seed. Corn harvesters are sometimes used if the growth becomes too large to be cut with the binder.

A very thin stand produces a surprising quantity of seed when neither clipped nor pastured.

Cutting should be done when about three-fourths of the pods have turned dark, and only when damp from dew or rain, as the seeds shatter easily. For this reason, when cut with a mower, the swath should not be run over.

When cut for hay or pastured the late plants are smaller and are harvested more easily, for the binder can be used. This facilitates handling and makes it possible to use a huller, otherwise it is sometimes necessary first to thresh the coarse straw and then run the seed through the huller.

In Mixture

A mixture, about like the following, is popular: Sweet Clover, four pounds; Alfalfa, four pounds; Alsike, two pounds; Timothy, four pounds.

Renovating Old Pastures

Worn-out pastures are often successfully renovated by disking in the fall and sowing a few pounds of Sweet Clover during the winter. Not only is the amount of pastureage increased by the Sweet Clover, but the grasses will be improved owing to the addition of humus and nitrogen furnished by the Sweet Clover. The same plan may be followed in the spring, but not as successfully. The Sweet Clover should be drilled in.

We have prepared a special chart "Sweet Clover Questions and Answers," which will be sent on request. It contains in handy form about all the information obtainable on Sweet Clover.

Columbus, Ohio.

"I here and now want to express to you my appreciation for the uniformly good seed and good service that I always get from your house."

W. R. POMERENE.

Hubam—Annual White Sweet Clover

It grows and grows and grows

THERE is some question as to when Annual Sweet Clover was first seen or recognized. In any case, Prof. Hughes of the Iowa Experiment Station is responsible for its identification and wide distribution. Its rapid growth and numerous uses will no doubt give it a prominent place in agriculture, though the seed is so much higher than that of Red Clover or the biennial sweet that it will be little used this season for hay, pasture or green manure. For some time to come it will pay very satisfactory returns as a seed crop.

When sowed in rows, from two to three pounds per acre are required, so the cost is not much greater than the sowing of the usual amount of other clover. Naturally, the price will decline from year to year, as it produces an abundance of seed and can be successfully grown in every State. Even if it gets down to a quarter a pound next year it will pay better than any crop we know of, as yields of 300 to 500 pounds per acre are common. At the same time, probably enough seed will be lost in harvesting to reseed the field.

Eventually Hubam's greatest value may be as a green manure crop. It will make possible a two-year instead of a four-year rotation. It produces a large amount of blossom over a long period of time, and so is desirable for bee pasture. Its one season growth is about as large as the two-year growth of the biennial. Plants often reach a height of seven to eight feet. A crop can be harvested in about four and one-half months, sometimes less. It is drought resistant.

Seeding should be done as early as possible. For seed production sow in rows. If eighteen inches apart, about two pounds are required; if closer, a larger amount. Of course, it can be sowed broadcast, about ten pounds per acre, but it is hardly practicable to do so this year.

Harvesting should be delayed as long as possible, although the seed ripens very quickly and shattering must be considered. Cut with a grain binder when the dew is on the plant, threshing in about one week if possible. (See Biennial White Sweet for harvesting directions).

We will be only too glad to answer any questions about Hubam, and as suggested under Biennial Sweet Clover, Government bulletins 797, 820 and 836, will be found valuable, particularly the one on harvesting the crop, No. 836.

We have pure seed free from weeds. It is scarified of course. Seed of the Annual plant cannot be distinguished from that of the Biennial.

It pays to inoculate Hubam. One of the largest growers in Alabama, where the plant is supposed to have originated, tells us that the fields inoculated with Scott's Bacteria produced much more seed than other fields.

Red Clover

RED CLOVER was first cultivated in Persia. It was carried to Spain and Italy in about the 16th century and was soon introduced into Holland. From Holland it was taken to England, and in about 1770 to Pennsylvania.

Red Clover is often called June or Medium Clover, the latter term to distinguish it from Mammoth.

Of all clovers Red is the most popular. Many feel that there is little need for other clovers where the Red can be grown. It is widely distributed through Europe and the United States and Canada, but unfortunately many soils that formerly grew Red Clover are now finding its cultivation difficult.

This is caused by one or more of the following conditions: fungus and insect diseases; the exhaustion of potash; acidity; lack of nitrogen gathering bacteria; lack of humus or organic matter.

Humus provides ventilation, binds the soil together and increases its water-holding capacity, prevents winter-killing and retains plant food for bacteria.

Much can be done to make "clover sick" soil again productive by restoring organic matter through the application of stable manure. Liberal application of lime will sweeten it and make conditions favorable for bacteria. Fertilizer rich in phosphorus and containing some potash is best for most soils. Even though Red Clover has been raised on the field in former years in many instances, it will be found advisable to inoculate.

After clover is several weeks old the roots shorten and draw the crown of the plant into the soil. This protects the plant and prevents winter-killing.

While Red Clover is recognized as a biennial, if favorably located it may last four or five years. It is observed that, when sowed with Timothy, the third year from seeding the stand is about half and half; the fourth year mostly Timothy.

Red Clover has always been popular for pasturage because it starts new growth quickly when eaten off. It gives a large yield of hay which is easily cured. The second crop can be utilized for hay, pasture or seed.

Red Clover is not adapted to stiff clay or worn-out soils. On these soils Mammoth is much to be preferred.

Best results are usually obtained from spring sowing, and for best germination the seed should be drilled in. In some sections of the country where spring sowing fails, summer seeding has proved advisable. Especially is this true south of the Ohio river. The plants escape the hot, dry weather of midsummer which often kills or weakens them.

It is often the practice to cut Red Clover too late. If the bloom begins to ripen the plant is injured. If cut when just in bloom the second crop will be heavier, there will be no danger of harming the plants and the hay will be more palatable. Red Clover, after

being cut, will not stand as much rain as either Alfalfa or Soy Beans. Thus it pays to cure it and get it in the mow or stack as quickly as possible. If cut in the afternoon when it contains less moisture it can be tedded the next morning and windrowed, shocked and mowed the same day. Partly cured Red Clover hay will not stand a thorough soaking.

Red Clover matures about the same time as some of the worst weeds, as for instance Buckhorn, Wild Carrot, Sorrel and Dodder. For this reason it is more difficult to find Red Clover free from weeds than any other variety.

We give especial attention to Red Clover seed because we sell more of it than any other. We have always been able to supply seed practically free from weed seeds and waste matter and we expect to continue to do it.

Quite often a customer sends us a sample of Red Clover which he can buy at a less price than ours. Invariably this seed contains Buckhorn and other weeds. No one has, however, ever told us that he could buy better seed than ours. We quote from Farmers' Bulletin No. 260:

"First-class Red Clover seed should contain very few weed seeds. This means at most but a few hundred and should mean less than 100 in each pound. Even this seems a large number, but clover seed production has not yet received that special attention which insures perfectly clean seed, and a few hundred weed seeds per pound constitute a small number when compared with the thousands and tens of thousands of weed seeds per pound found in many samples of Red Clover seed."

Italy has an enormous crop of Red Clover seed. She produced a great deal last year, of which much is left. Every year large amounts are sent to this country. There will be more than ever during the season of 1922. Most of it is distributed in and from the East, but many carloads reach Ohio and neighboring states. The Department of Agriculture can identify imported Red Clover for you. It is better to go to the trouble of sending samples there than to risk sowing Red Clover that is almost sure to winter-kill. The Department says that Italian Red Clover is no good. It usually contains a lot of weeds.

"I have received your catalogue and like it so well that I will certainly give your seed a trial. At present I am doing grass farming almost exclusively but find that 'Sour Dock' is making great progress in my orchard grass field and in the future will be very careful about the seed I buy."

RICHARD A. BARR,
The Barr Infirmary, Nashville, Tenn.

"I received grass seed O.K. I never saw any nicer seed."
THOS. J. McKELVY, Jefferson, Ohio.

Mammoth

Warranted True to Name

MAMMOTH CLOVER, also called English, Sapling, and Pea Vine Clover, like red, is a biennial, but where soil and climate are particularly favorable, or where prevented from producing seed, it is likely to show a perennial tendency.

As Mammoth Clover matures about three weeks later than Red, it is better suited for sowing with Timothy or Red Top, Red Clover being overripe at the proper time for harvesting either Timothy or Red Top.

Mammoth grows to a greater height than Red, has larger roots that penetrate to a greater depth, and for this reason will often do well on soils where medium clover will make an unsatisfactory growth, the vigorous growth of the Mammoth enables it to gather more plant food from impoverished soils.

On poor soils Mammoth makes more desirable hay because the growth is not so rank. The long roots enable it to withstand drought and winter-killing better than Red. On sandy soil it is superior to Red Clover which it excels as a green manure crop on account of its large growth of roots and stems.

While the hay is coarser than Red Clover hay it has the advantage of ripening a month later at the time when there is less danger from rain.

If a seed crop is to be made the clover should be pastured until about June first or clipped, otherwise the plant is likely to exhaust itself in the production of stems and leaves. If the weather is especially dry care must be used in pasturing as the plants may not receive enough growth to produce a large seed crop. On very poor soils it may not be necessary to pasture at all.

Mammoth makes a much surer crop of seed than red. It matures seed about three weeks earlier. Some growers assert that seed is produced just between two broods of clover weevil which often do much damage to Red Clover.

The very heavy growth usually smothers out most of the weeds and as a result we can always furnish Mammoth that is free from weed seeds. It seldom contains blasted grains.

Mammoth is supposed to be less subject to diseases than Red Clover. This may be because of its more vigorous growth and long roots which draw plant food from a great depth.

The seeds of Mammoth and Red Clover are so nearly alike that they cannot be distinguished. This likeness has resulted in much annoyance for the grower. We used to receive dozens of letters each year asking how we knew our Mammoth was true to name, most of the writers stating that they had more than once sowed Mammoth and been compelled to reap a crop of Red.

This seemed to be the common experience all over the country. We finally got tired of assuring people that they would find

our seed true to name and have for several years answered this question by guaranteeing the genuineness of any Mammoth Clover purchased from us. In other words we will refund the purchase price should any of our Mammoth seed produce a crop of Red Clover.

If you have had trouble in getting genuine Mammoth, especially if you have been unable to procure this seed entirely free from weeds, you may be assured that in our Mammoth you are getting the kind of seed that you want.

Alsike

ALSIKE seems to have been first cultivated near the village of Sike or Alsike, Sweden, and to have been introduced into England in 1834. It is not known when it was brought to America. On account of its appearance and habit of growth it was once thought to be a hybrid between white and red, but is now supposed to be a distinct species.

While not strictly a perennial it usually remains in the ground for several years. Enough of the heads escape the mower and the grazing of stock to do much toward reseeding. It is not nearly as particular about acid soils as Red Clover and will withstand winter-killing much better. It should be used in mixtures on any type of soil where the seeding is to remain more than three years, in this respect being preferable to red which dies in two years.

It is particularly adapted to wet soils, sometimes doing well in standing water.

Being free from the diseases that affect Red Clover, it will grow on moist soils even those that raise an indifferent crop of red.

The hay is finer than Red Clover hay and is preferred by stock but less is produced per acre.

Alsike gathers nitrogen from the air the same as Red Clover, and would be as valuable in the rotation as a soil builder except for its smaller root and stem growth.

Alsike and Timothy ripen together and the Alsike does not crowd the Timothy as badly as Red Clover does. For these reasons Alsike is preferred for growing along with Timothy. Because the Alsike does not crowd, it is often sown with Red Clover. It interferes but little with the growth of the Red Clover and should the latter fail to grow or be killed the Alsike will quite likely take its place. Often Alsike, on account of its spreading roots, will keep the Red Clover from "heaving" out. Much less Alsike than Red Clover should be used.

Except where grown for seed it is usually best to sow some other seed with Alsike, such as Timothy, Orchard Grass, Blue Grass, or Red Clover.

A good hay mixture is three parts Timothy, two parts Red, and one part Alsike.

South of the Ohio river Alsike, Red Top, and Orchard Grass make a desirable mixture for a semi-permanent pasture.

There are approximately 700,000 Alsike seeds to a pound, and 250,000 in a pound of Red Clover, so it takes much less of Alsike to sow an acre of ground.

As the seed is so small it should be lightly covered.

Probably because of acid soil, Canada Thistle, Sorrel and Buckhorn infest many of the sections where Alsike is raised for seed, so it is well to look out for these weeds when testing samples. They cannot be entirely removed in cleaning, as many of the weed seeds will be the same size as the Alsike. This is especially true of Canada Thistle.

Owing to its smaller size Alsike is hard to clean, but, by using care in selection, we are always able to furnish seed that is practically weedless.

As Alsike goes three times as far as Red, one bushel is enough for at least fifteen acres.

There is a great deal of Alsike this year and the price is low, but quality is somewhat disappointing as practically all seed is discolored and much of it contains White Dutch and Timothy. We will have some of this naturally mixed seed at very low prices indeed. Ask for samples. We have plenty of pure Alsike.

Crimson Clover

C RIMSON CLOVER is said to be a native of Southern Europe. It was introduced into Chester County, Pennsylvania, in 1820, but until 1880 its distribution was quite limited.

Crimson Clover is a winter annual, that is, being sown in late summer it goes through the winter in a green state, and matures its seed and dies in the spring. It will seldom stand the winters north of the 40th parallel.

Practically all of the Crimson Clover sowed in this country is imported from Europe. This means that the seed usually contains the seed of noxious weeds so that a careful examination should be made before buying. Use our test.

White Clover

W HITE CLOVER is usually called White Dutch to distinguish it from White Sweet Clover. White Clover is a native of America.

Many alsike fields contain White Clover. When the seed is harvested the two cannot be separated. Sometimes we have this mixed seed at prices lower than when the two seeds are bought separately.

Japan Clover or Lespedeza

THIS annual was brought to us from Japan. It is an annual. It has deep roots and will grow on very poor soil, but, unlike Crimson Clover, does not do well on sandy soils.

It was first introduced in South Carolina, and is popular all over the South, but is gradually working northward. Considerable is being sown with success in southern Ohio, Indiana, and Illinois. For soils so poor that no other legumes can be grown, we suggest the use of Japan Clover. It will reseed itself and gradually make fine pasture.

As this clover is sold in an unhulled condition, it usually is very poorly cleaned and full of waste matter. Those in the habit of sowing Japan Clover will be surprised at the quality of our seed.

Gentlemen:—We are writing to engage from you ten dozen cans of your Sweet Clover Bacteria for use during 1922. We will want this order booked for about January shipment. We are writing in time so as to be sure to get it.

We have used it exclusively this season in growing Annual White Sweet Clover, and we have had such good success with it and are so thoroughly satisfied that it is the best bacteria in commercial form, that we are recommending its use to all our customers to whom we sell seed.

All the clover that we have known of, that was inoculated with your bacteria, has made a good crop of seed. A great deal that was not inoculated failed. This may have just happened this way, but to our minds, it proves conclusively that it is good.

You may acknowledge this order and give us the price.

Yours very truly,

F. A. JAMES CLOVER SEED COMPANY.

“Enclosed you will find my check for \$5.00 for which kindly send me \$5.00 worth of your excellent grass seed. This is the fourth lot I have bought from your concern and I must say that your grass grows.”

P. K. TADSEN,
Madison and Second sts., Port Clinton, Ohio.

Soy Beans

THE soy bean is a native of Eastern Asia, coming from China or Southern Japan. In this country it has been an important crop for about twenty years.

The country is simply full of Soy Beans this year. They will probably never be as cheap again. You can afford to sow them any place on the farm for they are worth the price for soil improvement only.

Clover is so often a failure that it is necessary to find some legume that pays as large returns and at the same time is a sure crop. Soy Beans not only gather more nitrogen from the air than clover, but have a larger root system. Thus even though the crop is saved for hay or is pastured instead of being plowed under, the benefit to the ground is as great as from clover, as is indicated by the large yields of wheat and corn following a well inoculated crop of soy beans. The Ohio Experiment Station found that wheat yielded 10.3 bushels more to the acre on this sort of ground than on corn ground.

The Soy Bean is used for green manure, hay, forage, grain and silage.

It is probably the most desirable leguminous catch crop.

Invaluable to fill in with in case of failure of clover seeding or other spring crop.

The Soy requires from 90 to 150 days to mature. Some of the varieties will mature as far north as Northern New York, but the plant having originated in a warm climate, many varieties will not ripen except in the South.

It will grow in poor soils and increases the fertility of the land by means of the nodules on its roots. It endures drought, and stands excessive moisture fairly well.

They are more frost resistant than corn or field beans. Light Spring frosts will not kill the young plants and they are seldom injured by frosts in the fall when maturing.

The plant is moderate in its fertilizer requirements. Lime, applied previous to seeding, should be used on acid soils, though liming is not as essential as with other legumes.

As might be expected, trials made at experiment stations show that for milk and butter production Soy Bean hay is nearly as good as alfalfa hay. Cattle will leave corn to eat it.

The forage produced by the Soy is higher in protein than any other annual crop of equal yield.

Meal from the Soy Bean has none of the bad effects of cotton seed meal. Nothing will equal it for topping off cattle. When mixed with six parts of corn, a bushel of Soy Beans has the feeding value of three bushels of corn, that is, six bushels of corn and one bushel of Soy Beans amount to the same thing as feeding nine bushels of corn. We can supply it.

Experiment stations are urging that Soy Beans take the place

of oats in the rotation. By planting corn and beans together, then Soy Beans alone, either for hay or grain, followed the next year with wheat and clover, a legume is on the ground continuously. As an average crop of Soys, if inoculated, will store up as much as 125 pounds of nitrogen per acre, it can be seen what they will do for soil improvement when used in this way.

Seeding

In seeding Soys the seed bed should be prepared about the same as for corn, cultivating at intervals in order to kill weeds, for, like alfalfa, young Soy Bean plants are easily crowded out by a rank growth of weeds. They should be planted about corn planting time, but not until all danger of frost is past, and ground is warm. The seed should be planted not over 1 to 1½ inches deep. If a seed crop is expected it is best to plant as early as possible, but for hay or green manure even into August is not too late, the variety used making some difference. Although solid drilling requires more seed to the acre, and in wet seasons there may be some annoyance from weeds, many growers prefer this manner of planting for hay, silage or green manure crops. From 4 to 5 pecks are used. Laboratory experiments in New Jersey point to an increased or intensified use of atmospheric nitrogen where legumes are planted close together. When so planted there is possibly a greater recovery of nitrogen from the air per acre. Thick seeding is probably best for sandy soils. Planting in rows saves seed and permits cultivation.

Planted after wheat or oats are removed they will usually produce a paying hay crop. In any case they will be invaluable for soil improvement or for pasture.

In weedy ground it is best to plant in rows, but Soys drilled solid can be cultivated with a weeder or slant-tooth harrow. This should be done during the middle of the day when the beans are dry and tough. Do not cultivate until the beans are three inches high, nor after they have reached a height of eight inches.

For seed the beans must be drilled in rows and cultivated. A grain drill can be used for drilling in rows by covering up the necessary feed holes. This requires from 15 to 25 pounds of seed according to the size of the beans. The rows should be 28 to 30 inches apart, with the beans 2 or 3 inches apart in the rows. When a corn planter is used, some recommend attaching a shoe at the planter runner for regulating the depth. For solid drilling use the oats feed of an ordinary grain drill adjusted to drill, say, 75 pounds per acre.

Cultivation

As the entire bean is pushed out of the ground in sprouting, in case a heavy crust forms, it may be necessary to harrow the ground lightly before the beans sprout, or even as they are coming through the ground, but this should be avoided if possible. Unless weeds are getting the best of the beans they should not be disturbed until three or four inches high, when they are quite tough.

When planted in rows the beans can be cultivated until blossoms appear, but should not be disturbed after this.

In Corn

When planted with the corn Soys may be "hogged off" or "lambd off," or cut with a binder for putting in the silo. When the former, the lambs or pigs are turned in when the corn is about ready to cut for fodder and the Soys have begun to ripen. Pigs up to 50 or 60 pounds and the lambs will eat the beans without injuring the corn if it is desired to harvest it. If the entire crop is to be pastured, sheep or hogs of any size may be turned in. They take on fat and improve in general condition wonderfully. It is a good plan, if convenient, to feed Soys to stock a few days before they are put into the field, so that they will become accustomed to, and eat the beans readily, otherwise the larger animals will favor the fresh corn. Beans are so rich in protein that it is not necessary to feed tankage or any other protein feed.

For hogging off or for silage the beans are planted right in the rows with the corn. A special attachment can be gotten for the planter that makes it possible to do the whole job at once, or the corn may be drilled first, at the regular depth, and then the drill filled with beans, going back over the corn rows, being careful to plant the beans no deeper than one inch. The corn is planted about 18 inches apart, and the beans about 6 inches apart in the rows. This requires 6 to 10 pounds of beans. If the planter has a fertilizer attachment the beans may be mixed with the fertilizer or with dust, drilling the mixture as fertilizer. Corn and beans may be mixed together and drilled, but this is not a very satisfactory arrangement.

Soys should be planted in all corn fields when possible to utilize them, unless the fields are inclined to be very weedy. As they gather nitrogen from the air and the corn gets some of this, the growth of the corn is not lessened, and even though it were, the benefit to the ground and the extra forage would more than offset the loss. At least one ton of silage or soiling is added to the field. Many report yields of two tons, a large profit at practically no expense.

We sell a good many Soy Beans for broadcasting in corn just before the last cultivation. Under normal conditions this crop is worth while for hogging down or for soil improvement. One man plants them in corn each year for soil improvement, so that he can raise corn on the same field year after year. This late in the season we usually have a few varieties left that we can sell at a special price.

For Silage

The addition of the Soys gives the silage a much greater feeding value, as they contain 145% more digestible protein and 40% more fat than the corn silage. Of course, Soy Bean silage contains a very much greater amount of protein when the beans are allowed to form in the pods. It should be kept in mind that,

like corn, different varieties of beans have different dates of maturity, and that the variety to be selected is the one that not only makes a maximum growth of vine but also develops beans by the time the corn is ready for putting in the silo. If the beans are grown in separate fields three loads of corn run through the cutter, followed by a load of Soy Beans makes a well-balanced feed. They can be used much ripper than for hay, as they go into the silo without curing, and the juices of the corn soften the stems. The harvesting is done with a binder just as the corn alone would be harvested.

The addition of Soy Beans to the silage makes the purchase of oilmeal and tankage unnecessary and greatly increases the flow of milk.

Cornell University in a series of experiments found that non-leguminous plants grown with legumes contained a great deal more protein than when grown alone. As an example, oats grown with field peas contained 7% more protein than oats grown alone; timothy with red clover 44% more. It seems reasonable to suppose that corn grown with Soys should contain more protein than when grown by itself, especially if the Soys are inoculated.

For Hay

Soy Bean hay in curing will stand more unfavorable weather conditions than red clover or alfalfa. The plants should be cut when the pods begin to fill and a few yellow leaves are showing. Well-matured hay may not be so palatable, but is more easily cured. When once started the harvesting should be completed in as short time as possible, as the leaves fall rapidly when ripe. They may be cut with a mower and left on the ground until wilted; then raked up and placed in tall loose cocks for a week or ten days. A good method, however, is the use of the self-binder, setting the small bundles into cocks to cure.

For Seed

The seed cures to best advantage on the stalk, so beans should not be cut until absolutely necessary to prevent loss from shattering. A good guide is to wait until most of the leaves have fallen off. If the beans are well ripened it is possible to thresh in a day or two after cutting. If the beans are not allowed to get thoroughly ripe—and some varieties must be cut early or too many beans will be lost—the beans should be kept in cocks until thoroughly cured, otherwise the seed may be damaged when stored in bins or sacks. Cut when dew is on the ground. Some of the large growers of seed cut with a binder just as soon as the top leaves turn yellow, allowing the small bunches to lie three or four days, according to the weather, and then put in small shocks, reshocking at the end of ten days if the weather is favorable. In four or five weeks the beans are thoroughly cured. This leaves a large amount of leaves on the straw, most of which are lost if the beans are allowed to ripen thoroughly. Some are now using the Southern Soy Bean harvesters, which gather the beans from the standing stalks.

Threshing

An ordinary grain separator can be used by removing the regular concaves and using a blank or board. The speed must be cut down so as to avoid splitting the beans. Special bean separators can be purchased at reasonable prices. Soy Bean straw is relished more than any other straw by sheep, cattle and horses.

We find that a great many of our customers are using corn shredders for threshing their beans.

Inoculation

There is no question at all but that Soy Beans should be inoculated. They may grow nearly as well without inoculation, but will do this at the expense of the soil. When inoculated the roots become filled with large nodules, which make them the ideal crop for soil building. There is also little doubt that when they are inoculated the protein content of the plant is greater. For reasons stated before, we believe it is especially important to inoculate Soys that are to be planted with corn. In 99 cases out of 100 "no inoculation means no nodules."

Soy Beans in Mixtures

Soy Beans may be mixed with cow peas, sorghum or sudan grass, making a balanced forage; about ten pounds of sudan grass or fifteen pounds of sorghum with three pecks of Soy Beans broadcasted, make hay that is easily taken care of.

YELLOW S

Ito San

This small yellow bean is one of the best known varieties. It is a heavy seed producer, grows to a height of about 24 inches and matures in about 105 days. Owing to its early maturity, it is excellent as a catch crop. A good variety to sow with corn for hogging down. Although rather short it ranks well as a hay producer.

Elton

An early bean that matures just a few days later than the Ito San, but makes a larger growth. Good for planting in early corn. It is a large seed producer, and makes early hay and excellent hog pasture.

Manchu

An early variety somewhat larger than the Elton. Matures in about 105 days.

Hollybrook and Mongol

Nearly all experiment stations say that Hollybrook and Mongol are exactly the same. Both the Wisconsin and Illinois Stations carried out tests last year which showed that there is no difference. Several years ago we thought—and some still insist—that they

are not alike. But the seeds have exactly the same appearance, and we will hereafter list them as the same bean, shipping as Hollybrook, which is the better known name. We will for another year keep the lots separate, so we can ship what is known as Mongol if preferred.

The Hollybrook matures in about 120 days, is a fair producer of seed, makes excellent hay, and is particularly desirable for the silo as the lower branches are high enough to miss the corn-binder knives. An excellent substitute for Medium Green.

A. K.

This bean was first grown by the Illinois Experiment Station in 1914, and named A. K. because the shipping tag attached to the bag containing the sample sent for experiment contained these letters. It proved satisfactory and has had considerable distribution in Illinois. It is about five days earlier than the Mongol. It is a good bean for hogging down and makes good hay, but is inclined to shatter more readily than some varieties.

Mikado

This variety grows to a height of about 32 inches, maturing beans in 120 days. It is excellent for grain, hay or silage, but the stalks and branches are somewhat coarse.

Haberlandt

This is one of the most productive varieties. Has large, yellow seeds, grows to a height of 36 to 40 inches, and matures in about 125 days. This makes it a little late for ripening seed north of the Ohio River, although it is excellent for hay and silage any place.

Mammoth Yellow

This is a late southern grown variety, maturing in about 145 days. It will not ripen beans north of the Ohio River, but is grown to some extent for hay as far north as the New England States. We recommend an earlier kind for either hay or silage.

Medium Yellow

There is some confusion in the names of Soy Beans owing to carelessness and the fact that some growers have given a name of their own choosing to well-known varieties. This is especially true of the Medium Yellow. It has been called Early Yellow, Mongol, Roosevelt, Hollybrook, etc. We still have some demand for "Medium Yellows" but advise growers to purchase under some other name to be sure of getting what is wanted.

BROWNS

Early Brown

This is practically the same bean as the Ito San but seems to be hardier. Mr. E. E. Evans, of Michigan, who introduced both,

tells us that the Early Brown, besides being somewhat earlier, is a better all-round variety than the Ito San.

We have found this to be true. It shatters less. It is a larger and more profitable producer of seed. Unfortunately, many Southern growers sell a brown bean as Early Brown which is about as late as the Mammoth Yellow, and no more desirable. The bean can be recognized if compared with the true Early Brown, as it is larger, rounder and a darker brown.

Ohio 9035

This bean matures seed in 120 to 125 days. It is an erect, bushy plant, growing to a height of about 30 inches. The leaves are large. For Central Ohio and farther south there is no better variety either for hay or for seed production. Farther north, where a large quantity of hay is desired, it will be found to excel most other varieties. It probably resists shattering better than any other bean, an excellent point in its favor.

Virginia

All our customers seem to agree with Mr. Morse of the Department of Agriculture, that the Virginia is one of the very best hay and silage beans. On ordinary soil it grows to a height of fifty inches. Both the stalk and branches are slender, with binding terminals, thus making a fine and palatable hay. It matures in about 125 days.

BLACKS

Most of these have fine stems and leaves, and are desirable for hay and for silage, but many growers prefer the larger and coarser yellow beans for the latter purpose. As the hogs cannot find the black beans, the yellow kinds are more suitable for hogging down. In blacks the same variety often goes under several different names. We have found the Wilson, Sable, Sooty, Jet, Pekin and Arlington to be very much alike. Experiment Station reports vary greatly as to time of maturity and other characteristics.

Sable

The Sable matures in about 120 days; erect, growing to an average height of about 36 inches. It has a small stem and thin branches, which make it desirable for hay. It is probably a heavier yielder of grain than other black varieties.

Wilson

Matures in about 120 days, growing as high as 4 feet. It is inclined to vine more than the Sable and the pods are somewhat higher from the ground. The most popular black bean.

Pekin, Jet, Sooty

Our test plot shows these to be much like the Sable. Most blacks including the Sable seem to be selections from the Pekin.

Ebony, or Black Beauty

Bushy, with fine stem and branches. We have found it earlier and smaller than the other varieties, maturing very little later than the Ito San.

Black Eyebrow

This is an early bean that has become quite popular during the last few years. The seed is usually rather scarce, and therefore commands a somewhat higher price than other early beans. Matures in 105 days.

GREENS

Medium Green

This was at one time the best known bean but is gradually being discarded as a seed producer for the reason that in unfavorable seasons it suffers more than other varieties and at all times shatters so badly that there is a big loss in seed. The seed is always very scarce and high in price. As a substitute we strongly recommend the Mongol described under yellow varieties.

Morse

Light green or olive. A heavy yielder. Matures in about 115 days, growing to a height of 30 inches. It pods very close to the ground, which makes it less desirable for silage, but a very good bean for hogging down or for hay.

Besides storing up nitrogen, Soy Beans have a mellowing effect on the soil that puts it in fine condition for the succeeding crop.

They will grow on soil too acid for clovers.

While there is little danger of sowing weeds with Soys, there is some danger of planting Soys with a small percentage of germination, as they are easily injured in the curing process. There is also likelihood of planting a lot of split beans.

We have the most improved machinery for cleaning them and believe we are furnishing better beans than can be purchased most places.

We give dates of maturity for Ohio. The number of days required for the ripening of beans will vary somewhat with the locality and weather conditions.

In ordering Soy Beans we shall be glad if first and second choice is given. We shall undoubtedly have several varieties not listed here.

Ask for "Soy Bean Questions and Answers."

Faribault, Minn.

"The soy beans arrived O.K. and are the best and cleanest beans we ever saw."

Vetch

TWO kinds of Vetch are of agricultural importance in this country: Common Vetch (*Vicia Sativa*) and Hairy Vetch (*Vicia Villosa*). While there are both Winter and Spring strains of common vetch, the Spring is the only one sowed to any extent in this country, except along the Pacific Coast. It is an annual.

Hairy Vetch, also known as Sand and Russian Vetch, is a Winter Annual. It is especially well adapted to sandy soils and will do much to build up any poor soil. It will withstand very cold weather, and is without doubt the safest and best fall sowed cover crop for northern states. It is more drought resistant than most legumes. Being a great nitrogen gatherer, it should be inoculated.

Hairy Vetch is sown alone or with wheat or rye as a supporting crop. Where the winters are severe the nurse crop is indispensable.

Grains of Hairy Vetch are hard and require more moisture to cause germination than wheat or rye. For this reason, when planted in a dry season, the nurse crop sometimes makes an excellent stand while the Vetch shows only a few plants.

Many sow Hairy Vetch in July, but the usual practice is to sow it during the latter part of August or up to the middle of September with rye. Ten to thirty-five pounds of Vetch is sown with three pecks to one bushel of rye. The more Hairy Vetch the more the soil will be improved.

As the price is much lower than it has been for several years it can be used in larger quantities economically.

In some parts of Michigan Hairy Vetch is sown in the spring with Marquis spring wheat for a seed crop.

Hairy Vetch grows rather slowly in the fall, but recovers quickly in the spring, and makes an abundant growth to be plowed under, pastured or cut for hay.

Hairy Vetch may be seeded in the spring for pasture, either by itself or with a nurse crop, such as oats or barley. Sometimes it is mixed with Canada peas and oats as is Spring Vetch. In any case it will furnish excellent summer pasture.

Canada Field Peas

FIELD PEAS are usually spoken of as Canada Field Peas, the name having been given when the plant was comparatively unknown and the seed mainly imported from Canada. However, few varieties originated in that country.

Being a legume they are soil improvers and furnish a ration rich in protein. They can be sown for soiling and fodder, and are unsurpassed for green manure. They are usually sown with oats, about one bushel of each, thoroughly mixed. This combination makes a very desirable hay or soiling crop, the yield being quite large.

Unlike cow peas they should be sown as early as possible in the spring, and do best farther north than Central Ohio.

One bushel of Field Peas, one bushel of Oats, four pounds of Dwarf Essex Rape and eight pounds of Sweet Clover make excellent hog pasture that can be sown in the spring, the pigs being turned in when the oats and peas are about eight inches high. The clover may be omitted.

Cow Peas

THE Cow Pea, a native of Asia, was introduced into this country over a century and a half ago, and soon came into general use in the Southern States. Here it has remained a successful crop, owing to the fact that frost seldom interferes with its growth of foliage; however the Cow Pea has gradually found its way into northern latitudes, where it has been of high value as a forage crop and a soil improver.

Timothy

THIS grass was first brought to this country from England by Timothy Hanson of Maryland in 1720.

Timothy is distinctly a grass for hay rather than pasture, as it does not take kindly to trampling and close grazing. It is our hardiest and best known grass and is part of all mixtures.

The facts concerning seeding, harvesting, etc., are so well known that it is unnecessary to enumerate them.

Often Timothy seed contains a considerable amount of sorrel owing to the fact that both grow on acid soil. It is well to be on the lookout for this as well as for Canada thistle which is not easy to identify in Timothy seed.

In Timothy seed you will nearly always find a small amount of alsike, and quite often grasshopper specks. It is not possible to entirely remove either of these, and while they hurt the looks of the seed, they make no difference in the quality, and should not be confused with black plantain, which is somewhat triangular and flat.

One peck is the amount usually sown per acre, or if clover is to be sown in the spring—a bushel to six acres. A satisfactory mixture is 7 pounds Timothy, 7 pounds Red, and 3 pounds Alsike.

This season we can supply Timothy with a streak of alsike at the same price as pure Timothy. The alsike helps the hay wonderfully.

Grasses and Grass Mixtures

THERE hasn't been a harder season on grasses for years than the past one. The long siege of dry weather was a serious handicap to seed production. Quality, too, was below the average, so that it has been extremely difficult to secure any quantity of Blue Grass, Red Top, Meadow Fescue

or other grasses equal in quality to that we have customarily handled.

Prices are higher and there will be much inferior seed offered.

As a number of large users of lawn seed and a great many Golf Clubs purchase from us we must go to an immense amount of trouble in getting our grass seeds as clean as it is possible to make them. The extra amount of chaff and weed seeds which are removed from our seed not only assures you of greater value, but of cleaner fields and thicker stands of grass.

PASTURE MIXTURES

A mixture gives a longer period for grazing, furnishes a greater variety, yields a crop richer in protein and makes a better balanced ration than would the grasses composing the mixture if sown separately. But it does not pay to sow in a mixture any grass that will not do well alone. In choosing the grasses to go into the mixture such varieties should be selected that the good qualities of one will balance points in which the other is deficient. For example, the grass that forms roots on the surface is not desirable from the standpoint of fertility; another may send its roots fairly deep, but not be as suitable for pasture grass as the other. The two make a combination well adapted to grazing and maintaining the fertility. Pasture Mixture grasses should be selected with respect to their periods of growth so that grazing may be done through the longest possible period.

A small amount of various clovers should be included in the Pasture Mixture as legumes not only feed the grasses by pumping plant food from great depths to the surface, but also supply them with nitrogen drawn from the air, and, no doubt, greatly increase the protein content of the grasses. A small amount of Alfalfa will do much towards getting the soil inoculated. White clover will grow where nothing else will and Alsike does well in wet places. Due consideration must be given to the fact that the kinds of grasses that should be used depend upon the locality. Even in a single field parts will be found that are adapted to grasses that will not thrive in the rest of the field.

Salting patches of such weeds as quack and wire grass to induce close grazing will often rid the field of these pests.

Those weeds most distasteful to cattle thrive best in meadows.

Sow pasture mixtures at the rate of 20 to 25 pounds per acre.

We are always glad to make suggestions as to suitable combinations for your particular locality and conditions.

Meadow Mixtures

Meadow Mixtures, in contrast with pasture mixtures, should contain only grasses that mature at about the same date.

For reasons already stated it is more profitable to sow a mix-

ture of several grasses, including clovers, for hay rather than to sow one kind alone, for then the roots fully occupy the ground to a considerable depth, each variety getting its food from a different level, the legumes acting as feeders for the grasses.

Early Pasture and Soiling Mixture

The annual pasture mixtures have become popular. More energy value from the same acreage can be procured when these are made use of as soiling crops. Canada Field Peas and Oats probably take first rank. Rye and Vetch as well as Japan Millet and Dwarf Essex Rape are also used. Any of these can be added as desired to the following mixtures which we recommend:

No. 1. 8 pecks oats, 4 pecks field peas.

No. 2. 4 pecks oats, 3 pecks barley, 3 pecks rye.

No. 3. 6 pecks oats, 5 pounds sweet clover, 5 pounds alsike clover, 6 pounds timothy.

Kentucky Blue Grass (*Poa Pratensis*)

This variety of grass is native both to Europe and to North America, and, along with two or three other similar species, is the greatest American pasture grass. Authorities are of the opinion that it is grown more or less in every State in the Union. It makes the best sod of any of our grasses and does fairly well on a wide range of soils, although it is better adapted to clay than to sandy loam. It is a very nutritious pasture grass, but has little value for hay. The fact that it is both an early spring and a late fall grower makes it valuable for grazing at both ends of the season. Kentucky Blue Grass constitutes a part of practically every lawn and pasture mixture.

When sown alone, from 30 to 40 pounds per acre should be used.

This year Kentucky Blue Grass is very high in price. We suggest Orchard Grass, Meadow Fescue, and Red Top, as substitutes.

Orchard Grass (*Dactylis Glomerata*)

Orchard Grass, known as Cocksfoot in England, is a native of Europe. Its American name is due to the fact that it is successfully grown in partially shaded places.

Orchard Grass will stand more drought than Kentucky Blue Grass, but is not especially adapted to dry land conditions. It starts very early in the spring and grows rapidly so that it is valuable in a pasture mixture. Orchard Grass is inclined to grow in tufts or bunches so that it will not permit an even sod. Although of high nutritive value it is not relished by stock as well as Blue Grass and Red Top. It thrives best on rich, well-drained loams and makes a good growth in shady places. Twenty-eight pounds is the amount usually sown per acre.

It is seldom possible to get Orchard Grass that does not contain a considerable amount of dock and sorrel and quite often

buckhorn, all undesirable weeds. We have almost weedless Orchard Grass this year and the price is very reasonable.

Red Top (*Agrostis Alba*)

Red Top belongs to a class of grasses that are very widely distributed over the globe. It is a perennial which ranges in growth from a few inches to three or four feet according to the condition of soil and climate. It starts later in the spring than Kentucky Blue Grass, grows slower and matures later. Red Top is valuable for pasture and hay, but does not equal Timothy. While adapted to a great variety of soils it does especially well on wet bottoms and should always be included in mixtures for such land.

About 15 pounds of clean Red Top should be sown per acre.

Meadow Fescue or English Blue Grass

This deep-rooting strongly perennial grass is not better known because sowers have clung to Blue Grass, Timothy and Red Clover in mixtures. We recommend it strongly for all mixtures, especially with Kentucky Blue Grass so unreasonably high in price. Its deep roots will prevent other grasses from winter-killing.

Meadow Fescue survives in wet places, will stand trampling by stock, under these conditions any amount better than Timothy or Kentucky Blue Grass. It does particularly well in clay soils. While somewhat like Orchard Grass it is more succulent and not so bunched. Can be profitably grown throughout the Timothy region and farther south as it will stand more heat and drought than Timothy. It is best as a pasture grass, coming early in the spring and remaining late in the fall, but it makes a heavy yield of good hay.

Miscellaneous Grasses

Besides the grasses already mentioned, we are able to offer such varieties as are in general demand: Canada Blue Grass, Tall Meadow Oat Grass, Rye Grass, etc.

Millet

The term Millet takes in a large group of forage plants, the Foxtail being the one most widely known in this country. To the Foxtail group belong the Common, Hungarian, Golden, and Japanese varieties.

Golden Millet

This is the most largely used variety, being grown to a great extent in the West, most of the seed coming from that section.

Thirty-five to fifty pounds per acre.

Hungarian Millet

This is smaller and earlier maturing than the Golden. The hay is somewhat more desirable as it is not as coarse. Thirty-five to fifty pounds per acre.

Dwarf Essex Rape

This valuable plant has been extensively grown in this country during recent years only.

The cost of sowing is very small as only four or five pounds per acre are required.

It grows from 1½ to 4 feet high and makes a large amount of forage for sheep, hogs or cattle.

Most of the Rape used in this country is imported. On account of the small amount of Dwarf Essex being grown at this time, other varieties are offered, many of them of little value, some contain weed seeds.

For several years it has been almost necessary to sow rape from Japan which is not as satisfactory as the English and Holland grown. We can now supply the latter.

Sudan Grass

Sudan Grass has become increasingly popular because it will grow on almost any kind of ground, will withstand drought, and yields abundantly. It will make a crop on less moisture than any other grass. It is an annual of the sorghum family, but produces several times as much feed as Sorghum or Millet. It is fully equal to Timothy as a feed. (The plants stool remarkably.) It is used for pasture, soiling, ensilage and hay. While it is a very heavy grower, the hay is not coarse and it is relished by horses, cattle and hogs.

When all of the smaller grasses are withered on account of dry weather, Sudan furnishes plenty of green, rich pasture. It is particularly desirable in any ground which does not hold the ordinary pasture grasses. It should be sown about two weeks after corn planting time, with a grain drill or broadcasted. Fifteen to twenty pounds per acre is required unless drilled in rows to be cultivated for seed, when four pounds per acre are sufficient.

The first crop is ready for hay in from sixty to eighty days. It should be cut when in bloom, although cutting may be done a little earlier when the plant has started to head out. The second crop should be ready in forty-five days. Two crops are all that can be expected in the North although as many as four are harvested in the South. Sudan is now very low in price. This year we have seed of especially good quality.

Corn

IN BULLETIN No. 414, Mr. Hartley, of the Department of Agriculture says: "The nomenclature of corn varieties is in such chaos, that a varietal name is of little significance compared with the vigor, productiveness and purity of the seed. The Leaming is as constant and well recognized a variety as exists, yet seed ears purchased under this name in Connecticut or New York are, in appearance and productive ability as unlike ears of Leaming purchased in Ohio or Illinois as they are unlike ears of other varieties."

Our aim is to have each variety true to type and unmixed, but as nearly everyone has different ideas as to the ideal ear when selecting his seed corn there is naturally a great variation in the type of varieties bearing the same name.

The best insurance against loss of your labor is being certain that you plant good seed. No one ever produced a good corn crop from poor seed.

A maximum yield can be expected only when there are no weak or missing stalks. To plant a bad ear means about 900 weak, barren or missing stalks to the acre.

Cultivation, fertility of soil and drainage affect the production of corn but the crop depends first upon the selection of seed.

It is necessary to keep down such rank growing weeds as foxtail, cockle, ragweed, etc., as well as the smaller weeds in order to save the moisture and fertility of the soil for the corn, which needs both in abundance.

Experiments have shown that nearly always shallow cultivation is preferable to deep. In no case should corn that has reached a height of 2 or 3 feet be cultivated deeper than 4 inches. By the time the corn has reached this height the roots have spread from hill to hill. Probably 2 or 3 inches is deep enough to kill the weeds and at the same time miss the roots.

Cultivation aerates the soil and keeps it warm by preventing the evaporation of moisture.

The butt grains are fertilized first, and the pollination of the grain proceeds in regular order towards the tip. Owing to this delay in development the tip grains are thought to vary from type more often than the grains on the rest of the ear.

Experiments conducted by the Kansas Experiment Station in the field show that 90% of the middle grains produce plants while only 86% of the butt grains and 70% of the tip grains produce plants.

Thus corn should always be carefully butted and tipped by hand before grading, for no grader will entirely eliminate these undesirable grains. If they are not removed the planter is likely to drop the seed unevenly which will cause a smaller stand, as a uniform number of grains to the hill or space must be planted if the largest yield is expected.

Corn should ripen early enough to escape frost and late enough to make use of all favorable growing weather.

The smaller early types are now believed to be more favorable for filling the silo than the larger ensilage corns. To give best results silage must have a larger percentage of nutritive value than is found in the immature sappy fodder of southern sorts. The ears should be ripe enough to be well dented and not too soft.

In describing the different types we have tried to give the exact number of days in which they will mature, as we see no reason for listing a 110-day corn at 85 or 90 or even 100 days. Growing conditions, however, affect the maturity of corn several days either way so it is impossible to tell the exact number of days.

Guaranty

It is manifestly impossible to guarantee corn to grow and make a crop—too many things can happen after it has been planted—but we guarantee our corn to show a high percentage of strong germination in any test that you care to make.

Keep the shipment just as long as you please. If there is anything that you do not like about the corn send it back and we will return your money, paying all transportation charges of course.

Little Clarage

This corn has become very popular. Many of the men who have grown it claim that it will ripen in 85 days, but we have found that enthusiastic growers of early corn are usually about ten days off in their estimates of ripening time.

Ears average from 7½ to 8 inches long and the corn never fails to ripen. The cob is small and the production of shelled corn will be about equal to that of many of the larger eared kinds. For an extra early corn we know of none that will surpass it.

Leaming

This is a yellow dent corn, about nine inches long, with a medium large cob. It matures in about 110 days. Besides being a large yielder, it is valuable for either forage or ensilage, being used quite extensively in the East for the latter purpose.

Little Cob Yellow Dent

This is an early corn with a very small cob. The ears average 9 inches in length. Although a yellow corn, every cob is white. The grower who began raising it forty years ago thought he liked white cobs better than red. It is carefully selected, high-bred corn and as we sometimes find a single ear of Flint in a field we suppose there was a mixture of Flint in the original selection. This may account for its very small cob and the fact that it matures early and thoroughly.

For a quick-ripening, all-around corn we know of none that will give better satisfaction. We recommend it for early ensilage as the stalk contains more leaves than other varieties. If you are not entirely satisfied with the corn you are growing, we suggest that you give this variety a trial. It matures in about 110 days. We have about discontinued selling late varieties. The percentage of failures is too great. We believe there is no variety that will surpass Little Cob as a general all-around corn.

110-Day White (Commonly called 100-Day White)

Of this corn we cannot speak too highly. The ears average $8\frac{1}{2}$ to 9 inches in length. We could probably best describe it by calling it a white Clarage. The grains are inclined to be broad and they are never chaffy, but hard and firm and of great feeding value. Altogether, it makes the most solid corn of any variety we have ever seen.

It does equally well on either clay or black land. In favorable seasons it will mature in less than 110 days, being earlier than most of the so-called 100-Day or Early White corns and superior to them. Those who like a white corn will find that this will meet every requirement.

Ensilage Corn

In ensilage corn we can supply the Virginia or Blue Ridge type. This is one of the best ensilage corns. It makes a large growth of thick succulent fodder.

We often have varieties not listed here.

Wheat

ALL wheat is more or less mixed—there is no doubt of that. The threshing machine goes from one farm to another, always carrying at least a few grains from each place, so that no matter how careful the grower may be, he cannot keep his seed entirely pure.

We do our best to supply varieties that are true to name and unmixed, but have never succeeded in doing it to our entire satisfaction.

Wheat should be sown two bushels to the acre, as it has been shown through many tests that where this amount is used more profit is realized than where six, seven or nine pecks are sown. There is absolutely nothing in the claim that a peck or half-bushel of certain varieties is enough for an acre.

Poole

This is one of the old standbys. It is beardless, a heavy yielder and stands the winter well.

Portage

Developed by the Ohio Experiment Station and is a pure line selection from the Poole. It is a good milling Wheat and in stiffness of straw ranks a little below the Poole. It has a smooth head, red chaff and red kernel.

Gladden

This is a pure line selection of Gypsy, developed by the Ohio Experiment Station. It has a very stiff straw, is a large yielder, and as a milling wheat is above the average. It is bearded, with a white smooth chaff and red kernel.

We find that the demand for Gladden is increasing each year, not only in Ohio, but in other states.

Trumbull

Developed from Fultz by the Ohio Station. It has become one of the best and most popular smooth varieties.

Spring Wheat

We sell the Marquis variety.

Oats

IN THE United States, Oats are second in importance to wheat and corn only. There are many different strains and varieties. We have found those listed below to give excellent satisfaction.

Sixty-Day

Not only is this the earliest Oats, but one of the largest yielders. Owing to its extreme earliness it will make a crop where later varieties will fail. The straw is short and does not lodge, which makes it particularly desirable for a nurse crop. It has great feed value for the reason that the hull is thin and light. One of the best varieties for a soiling crop used in connection with field peas.

Scottish Chief

We sold this variety in 1916 for the first time, having brought in a carload from Montana.

We have been selling the Oats raised from this original carload ever since. All reports indicate that the Scottish Chief will out-yield other varieties. They are a trifle earlier than the average oats and have a stiffer and shorter straw. We cannot recommend this variety too highly.

Oats are usually sown two bushels to the acre.

Northwestern Grown

Owing to the unsatisfactory quality of the 1921 oats crop, we will have Northwestern Grown Oats this year.

Rye

Rosen Rye

THIS pedigreed variety was originated by the Michigan Experiment Station. The berry is larger and plumper than other rye, the heads long and broad. Another great advantage is the stiffer straw, enabling it to stand up better in heavy wind and rain storms. It showed an average yield of 40

bushels per acre at the Experiment Farm, and will always exceed the yield of ordinary rye by from 5 to 15 bushels per acre. Sow about one and one-half bushels per acre.

Barley

ONE-EIGHTH of the entire production of Barley is raised in Wisconsin where special efforts have been made to increase the yield by establishing pedigreed varieties. These efforts have borne fruit in the development of a more desirable strain.

Experiments have shown that the Wisconsin Pedigreed Barley outyielded the ordinary Barley by 5 bushels per acre.

We have an extra fine quality of this Barley which we have very carefully re-cleaned.

We remove all small and blasted grains, as well as all weed seeds.

Two bushels are sown per acre.

We sometimes have Beardless Barley but very seldom for it is always mixed.

In addition to the grains described here, we can furnish Sorghum, Kaffir Corn, Buckwheat, Cow Horn Turnips, etc.

Lawn and Golf Course Seed

Ask for Booklet "Weedless Lawns"

WE GUARANTEE our lawn seed to grow. Owing to its freedom from weeds and dead grains it should go at least 25% farther than other mixtures. We have lawn seed for both ordinary and shady places.

We shall not attempt to go into an extended discussion of lawns and lawn seed here. The matter is too important to crowd into a small space. In our booklet "Weedless Lawns" we believe we have handled the question of making and maintaining lawns a little more carefully than is usually done.

This booklet describes and illustrates the weeds usually found in lawns and tells how to get rid of them, how to keep from sowing them and how to judge lawn seed, besides giving instructions for the sowing, mowing, watering and general care of the lawn. It applies as well to the maintenance of golf courses.

We will gladly send the booklet on request.

We have a special trial offer on lawn seed of three pounds for one dollar, postage paid.

Legume Bacteria

Ask for Bacteria "Questions and Answers"

NITROGEN, which is essential to the growth of all plants and animals, is constantly being removed from the soil. Some of the instrumentalities of its removal are: the growth of grain and other crops, the drainage of land, the action of wind and rain. A portion of this loss may be made up by the manure produced on the farm and by commercial nitrogen, but the cost of the latter is too great for profitable use. The only way in which nitrogen can be supplied so that farming may be profitably conducted is to draw upon the unlimited supply in the air.

Only the legumes, clover, beans, peas, etc., are capable of utilizing the nitrogen of the atmosphere. They are rich in protein, requiring more nitrogen than other plants; being heavy nitrogen feeders would be against them if they could not take the nitrogen from the air and use it. The air is made up of several gases, the proportion of nitrogen being 79%.

A legume cannot of itself make use of this nitrogen but the bacteria which live within the nodules on the roots are able directly to utilize the nitrogen of the air. The nitrogen passes into the bacteria and is changed along with other substances that are present into more complex nitrogenous substances which are used in some unknown way by the legume. The legume gives the bacteria a favorable place for development. It supplies the bacteria with sugars and other substances they need and in return the bacteria make the nitrogen of the air available for use of the plant.

The bacteria penetrate the root hairs and rapidly reproduce themselves. After a time the bacteria reach the interior of the root, still reproducing, and pass from one cell to another. The root enlarges and the nodule is formed. A plant cannot take nitrogen from the air unless the proper strain of bacteria is already in the soil or is introduced by inoculation.

To show that inoculation pays and performs a real service for the farmer legumes have often been grown experimentally in sterilized soil that is entirely lacking in nitrogen. In these tests the inoculated plants make vigorous growth in spite of the absence of plant food in the soil.

Besides storing up nitrogen for the use of following crops, inoculation in most cases increases the growth of the inoculated legume, besides, making this legume richer in protein. Even though the yield is not increased the plant is without doubt storing up nitrogen for crops that will follow instead of robbing the soil for its own use.

"Friendly Workers of the Soil"

The subject of soil bacteriology and its relation to practical farming is interesting and important. There is too much to be

said on this subject to do it justice in a few short paragraphs, so we have prepared a booklet entitled "Friendly Workers of the Soil." You will not find it tedious reading and the information it contains should prove helpful to every farmer.

The problem of keeping the soil as productive as possible is vital. If the ground is kept in a healthy condition you avoid half the gamble of farming. Inoculation is a big factor in increasing yields and in enhancing the value of your farm by building up the soil. The scientific way as compared with the soil method is not only more thorough but more economical.

Scott's Guaranteed Bacteria

The greatest advantages of Scott's Bacteria may be enumerated briefly: ease of application, economy, and guaranteed results. These three factors are worthy of the closest consideration in buying inoculating material. It has been difficult in the past to secure cultures that measured up in all three respects.

When you are ready to plant a legume of any kind, send for enough of Scott's Bacteria to inoculate. One can is sufficient for thirty pounds of clover, or sixty pounds of peas or beans. The price of one dollar per can, postage paid, makes the cost per acre very small. Yet the investment probably pays greater returns than anything that can be done on the farm.

In ordering please specify the kind of legume you want to inoculate. The following groups are each inoculated by different strains of bacteria: Alfalfa, Sweet and Burr Clovers; all true clovers, Red, Alsike, Mammoth, Crimson, and White; Cowpeas, Jap Clover, Lima and Velvet Beans; Soybeans; Garden and Field Beans; Garden and Field Peas, and Vetches.

If you have not received "Friendly Workers of the Soil," or, having looked it over, wish additional copies, let us hear from you.

Perhaps you can get Scott's Bacteria through your County Agent. Last year over a hundred of them kept a supply in the office.

"I have sold eighteen cans for which I enclose check for \$18.00. I regret very much not being able to place more of this bacteria. Those who have used it are very well satisfied with the results."

W. P. SADLER County Agent,
Warrenton, Virginia.

"I have received all six cans of bacteria you sent me. I put it on three bushels of clover seed and put it on about 20 acres of oats ground. I now have as fine a stand of clover as I ever saw."

B. H. SANDERS, Carbon, Indiana.

"We should like heartily to thank you for and congratulate you upon printing 'Friendly Workers of the Soil,' which is in many ways a highly creditable and useful epitome of technically accurate information on an important subject. We think so much of the books of this type which you have been publishing in recent years that we keep them on file for reference purposes."

THE BREEDERS' GAZETTE,

Chicago, Ill.

A Few Points About Ordering

Order Early. It always pays. Prices may be no higher, but sometimes it is impossible to get pure seed late in the season.

Order Blank. Use it, please. When shipping point is different from your mail address give county under each name. There is space on the back for a few names.

Prepay Stations. If yours is a prepay station, be sure to so state on the order blank and send plenty of money for freight charges. We return the difference.

Freight or Express. We always ship by freight unless otherwise specified. However, one should keep in mind that express companies give low rates on seed. A small order can sometimes be sent as cheaply by express as by freight. On moderately sized orders we advise express. Marysville is in Union County, Ohio, thirty miles from Columbus on the C. C. C. & St. L. and T. & O. C. Railways. Beans, Peas, and Grains take fourth class freight rates, seeds third class rates.

Parcel Post. Seed may be sent by parcel post according to the following table. In the first, second and third zone the weight limit is 70 pounds; in the others the weight limit is 50 pounds.

Zone Rates

Zone	1st lb. or fraction	Additional lb. or fraction
1st within 50 miles of Marysville.....	5c	1c
2nd within 50 to 150 miles of Marysville.....	5c	1c
3rd within 150 to 300 miles of Marysville...	6c	2c
4th within 300 to 600 miles of Marysville...	7c	4c
5th within 600 to 1,000 miles of Marysville..	8c	6c
6th within 1,000 to 1,400 miles of Marysville	9c	8c
7th within 1,400 to 1,800 miles of Marysville.	11c	10c
8th within 1,800 and over miles of Marysville	12c	12c

BAGS

It is not possible to ship three bushels of seed in one bag. It would be better if no bag contains over two bushels of seed, for there is less likely to be a loss as a result of careless handling by railroad employees. The express company will not permit us to

ship over 120 pounds in a bag. We furnish bags at practically cost, so you get full value. We prefer to ship in new bags; but if you wish, send your own, being sure to put your name and address on the package.

If you send your own bags, kindly mail them and your order on the same day, but not in the same package. A delay in shipping is often due to the failure of bags to reach us promptly. Should they fail to reach us within two or three days after the order is received, our custom hereafter will be to use new bags, deducting seed to pay for them, and return yours, should they arrive later.

Burlaps are not suitable for seed, and usually cause losses on grain shipments.

Change in Price

All seed must be sold on the basis of market quotations. It is for this reason that our prices are for prompt acceptance. A slight fluctuation, however, does not affect our prices. We always accept orders at the prices quoted if at all possible, but we must follow any material changes whether they be up or down.

If you delay ordering after our price list has reached you some instructions for a possible adjustment should be sent. The simplest method is by adding or deducting seed. We often do the former or refund by check, but we never deduct seed unless so instructed. Taking the time to write causes a delay but we must be sure that the extra cost is approved by our customer.

Please remember that anything which detracts from efficiency is an expense and that eventually the buyer must pay it. We therefore ask your co-operation in enabling us to handle orders as economically and as promptly as possible. If you wish to do so, just send along for the seed you require without writing for later quotations. Give us instructions to be followed in case of a change in price and we will guarantee that our treatment of the order will meet entirely with your approval.

Cash With Order

In Every Case We Must Adhere To This Policy

We would be perfectly willing to let down a little, but having had so much difficulty, especially in getting the small balances off our books, we are going to ask everybody, without exception, to include cash with order. If an error has been made in addition or for any reason there is a small balance due, we will deduct seed; or if you are not sure of price and in a hurry, you might send us a blank check, protecting yourself by writing in "not good for over \$.....," and we will fill in the cost of your order.

Freight and Express Rates from Marysville, Ohio.

	Freight Class		Ex. per 100 lbs		Freight Class		Ex. per 100 lbs
	3rd	4th			3rd	4th	
Arkansas				New York—Con.			
Little Rock....	\$2.16	\$1.77	\$3.06	Delhi.....	\$0.78	\$0.53	\$2.03
Connecticut.....				Elmira.....	.67	.47	1.82
Hartford.....	.89	.63	2.39	New York.....	.84	.59	2.23
Delaware.....				Rochester.....	.63	.47	1.82
Wilmington...	.78	.53	2.13	Syracuse.....	.67	.47	1.92
Dist. of Col.				North Carolina			
Washington...	.80	.55	2.03	Raleigh.....	1.42	1.05	2.86
Georgia				Ohio			
Atlanta.....	1.86	1.52	2.75	Cambridge....	.39	.30	1.09
Illinois				Celina.....	.37	.28	.94
Chicago.....	.61	.46	1.46	Cincinnati....	.44	.33	1.09
Danville.....	.58	.44	1.35	Circleville....	.35	.27	.94
Springfield....	.66	.50	1.71	Cleveland.....	.46	.35	1.09
Indiana				Mansfield....	.37	.28	.94
Auburn.....	.53	.40	1.19	Pomeroy.....	.48	.36	1.09
Evansville....	.58	.44	1.71	Portsmouth...	.49	.37	1.46
Indianapolis...	.51	.39	1.35	Toledo.....	.42	.32	.94
South Bend...	.59	.44	1.35	Zanesville....	.39	.30	1.19
Iowa				Pennsylvania			
Des Moines...	1.37	1.07	2.50	Clearfield....	.80	.55	1.67
Kentucky				Meadville....	.78	.53	1.35
Hickman.....	.79	.69	2.08	Philadelphia...	.78	.53	2.13
Lexington.....	.83	.70	1.35	Pittsburgh....	.56	.42	1.46
Williamsburg..	.78	.53	1.97	Wellsboro....	.80	.55	1.82
Maine				Wilkesbarre...	.78	.53	2.03
Portland.....	.89	.63	2.54	Rhode Island			
Maryland				Providence....	.89	.63	2.50
Baltimore.....	.80	.55	2.03	Tennessee			
Massachusetts				Knoxville....	.98	.77	2.39
Boston.....	.89	.63	2.39	Vermont			
Michigan				Montpelier....	.80	.55	2.39
Detroit.....	.50	.37	1.19	Virginia			
Grand Rapids..	.58	.44	1.35	Hampton.....	.81	.56	2.50
Jackson.....	.51	.39	1.19	Charlottesville	.81	.56	2.03
Ludington....	.77	.58	1.82	Richmond.....	.81	.56	2.39
Minnesota				West Virginia			
Minneapolis..	1.19	.86	2.86	Charleston....	.55	.41	1.61
St. Paul.....	1.19	.86	2.86	Clarksburg....	.60	.44	1.46
Missouri				Harrisville....	.60	.44	1.19
Jefferson City.	1.18	.90	2.44	Huntington...	.49	.37	1.46
New Hampshire				Morgantown...	.60	.44	1.61
Concord.....	.89	.63	2.54	Wheeling.....	.56	.43	1.19
New York				Wisconsin			
Albany.....	.81	.57	2.13	Madison.....	.67	.51	1.92
Buffalo.....	.63	.47	1.71	Milwaukee....	.67	.51	1.82
Canton.....	.89	.63	2.13				

Legal Weight and Quantity Per Acre

KIND OF SEED	Pounds sown per acre	Weight per bu.
Timothy	10 to 15	45 lbs.
Alfalfa	10 to 15	60 lbs.
Alsike	5 to 8	60 lbs.
Red Clover	10 to 15	60 lbs.
Crimson Clover	10 to 14	60 lbs.
Sweet Clover (hulled)	12 to 15	60 lbs.
Red Top Fancy (solid seed)	14 to 20	14 lbs.
Blue Grass	30 to 35	14 lbs.
Orchard Grass	25 to 30	14 lbs.
Meadow Fescue	20 to 24	24 lbs.
Tall Oat Grass	20 to 30	14 lbs.
Lawn Grass Seed	60 to 80	
Canada Field Peas (with oats)	90 to 100	60 lbs.
Cow Peas (broadcast)	90 to 120	60 lbs.
Cow Peas (drilled)	50 to 60	60 lbs.
Soy Beans (broadcast)	60 to 75	60 lbs.
Soy Beans (drilled)	30 to 40	60 lbs.
Dwarf Essex Rape	4 to 7	50 lbs.
Golden Millet	40 to 50	50 lbs.
Hungarian Millet	40 to 50	50 lbs.
Japanese Millet	15 to 20	32 lbs.
Sorghum	70 to 90	50 lbs.
Buckwheat	60 to 75	50 lbs.
Oats	75 to 90	32 lbs.
Barley	90 to 110	48 lbs.
Wheat	90 to 110	60 lbs.
Field Corn	8 to 10	56 lbs.
Rye	75 to 85	56 lbs.
Sudan Grass (broadcast)	20	50 lbs.
Vetch	20 to 35	60 lbs.
Japan Clover	15	25 lbs.

"Have a beautiful patch of the Grimm Alfalfa, and everyone that sees it thinks it very fine."

GEO. W. DAVIS, Owenton, Ky.

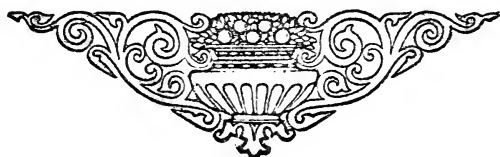
Greenville, Ky.

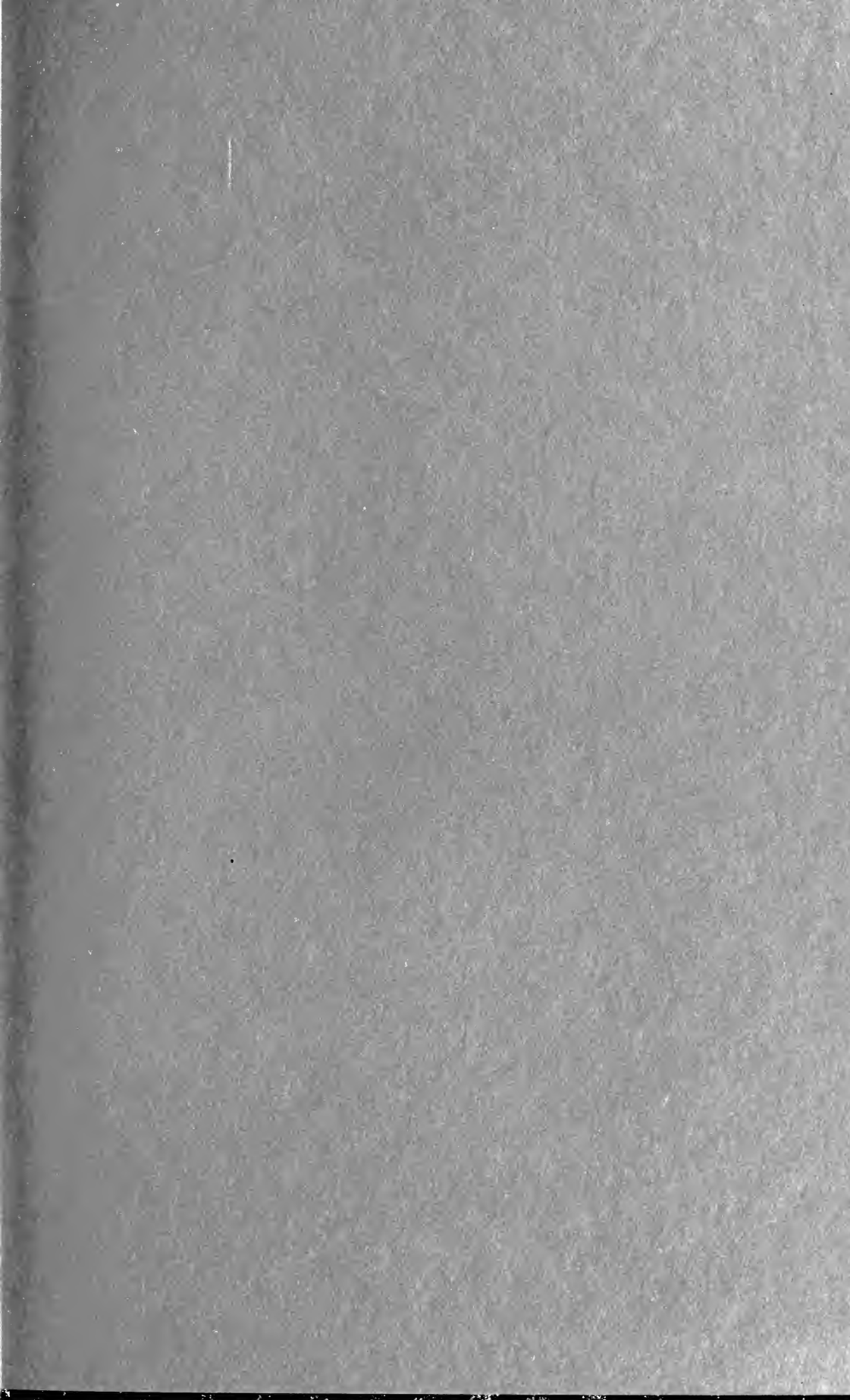
"The beans are the best that I have seen this year. We got a perfect stand and will yield lots of forage for the hogs. It is my intention to sow about 25 acres next year and when the time comes I shall order from you."

Respectfully,

F. O. TOWNES, Co. Agent.

“Diplomacy can be utilized in farming quite as well as in affairs of State. Nature is a curious dame who has her own way of accomplishing results. He farms best who seeks to humor her and gain his ends along the lines of least resistance to her likes and dislikes.”





SCOTT'S
FIELD
SEEDS